ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E.
General Editor: J. H. COSENS
Technical Editor: P. W. TUCKER, M.I.E.E.

28 MAY 1954

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Education for Engineering

EARLY in the annual (1953-54) report of the Institution of Electrical Engineers, which was reviewed in last week's issue, it is stated that although the growth of membership in post-war years has been maintained, and though there has again been an increase in the number of graduates, the elections and transfers to this class are not adequate to meet the country's needs for professionally qualified electrical engineers. This is tantamount to saying that insufficient recruits are coming from the training colleges and universities and, to take the long view, it reflects a very serious position in the electrical industry. But why the shortage of recruits?

Under the impetus of the unprecedented continuous production drive since 1940, the demand by industry and research for scientists and engineers of the graduate type has increased enormously, and to cope with this situation the universities have greatly increased their science and engineering faculties. This, in its turn, has thrown a strain on the schools which have to supply the additional students to the colleges, particularly because they are not receiving a proportionate return of the students in the form of science teachers, and this has resulted in fewer and fewer aspirants for the universities and colleges attaining the standard required.

Then the problem is further aggravated by the tendency to teach " general science," i.e., a number of the sciences collectively instead of a particular science at a higher standard, because of the calls for " broader general education." Although many consider this desirable, the fact remains that the man with the specialist knowledge is the one in greatest demand. This has led to a state of affairs in which in schools which cater for the more academic minded children the curriculum is so arranged that the more gifted pupils study, say, " higher physics," while the mediocre brains are left to tackle " general science." Further, there is a call for more people with general degrees to teach science, which means that there are fewer teachers with specialist knowledge, and so the circle becomes even more vicious. Then there is the trend in schools with limited staffs to go all out for general science, and this means planning for the less gifted at the expense of the brighter students.

All the foregoing seems to suggest that the basic trouble lies in the normal school education. One suggestion for coping with the problem is worthy of very serious consideration. It is to pool the resources of an area for science teaching at, say, the sixth-form stage, so that the classes would be organized in areas rather than in schools. From the viewpoint of the individual school there are disadvantages in this, but the problem is so serious as to demand drastic measures. Indeed the whole problem calls for an unemotional examination, and it may well be that the real solution will be found only in an entire change in the present conception of science teaching in schools, a conception which could only be brought about by the fullest co-operation of all concerned—the professions, industry, the universities and colleges, and the schools, and there is no body more qualified to establish the necessary liaison than the Institution of Electrical Engineers through its Education and Training Committee.

WIRES AND CABLES

It is difficult to assess the probable effects of the Government's acceptance of the Monopolies Commission's report on electric wires and cables. When the report appeared in 1952 we said that although it disclosed what had been secret matters it had not been proved that the Cable Makers' Association and its associated bodies had been engaged in a conspiracy against the public interest. In fact, the public interest has been served by the insistence of the C.M.A. on the maintenance of high standards by its members. Since the Commission made its investigation conditions for the cable makers have altered considerably; they were then experiencing a boom which has since tailed off and the situation is not now so favourable to them. No doubt they have given much consideration to the Commission's recommendations in the past two years and are prepared to make any necessary adjustments in their arrangements. We may repeat the conclusion of our leader of 11th July, 1952:—

> "As the report seems to show that independent manufacturers' profits have been at a higher rate than those of C.M.A. concerns it is doubtful whether the recommendations (if adopted) will mean lower prices. The effect may be to unsettle a stable industry with a splendid export record, but justice will be seen to have been done."

COAL AND ELECTRICITY

At several points in the National Coal Board's report for 1953 there are appreciative references to electricity. In dealing with fuel efficiency, for instance, the Board refers to the endeavours which it is making to improve the use of fuel within its own establishments. Although it is necessary to retain some steam-driven plant much of this type of plant is inefficient and "the first and main step necessary to remedy this—electrification—is proceeding apace." Again, in the matter of reducing atmospheric pollution, the Board recognizes the part which electricity and gas can play, although it agrees with the Ridley Committee that for some purposes these two agents are less economic. At the same time the production of smokeless solid fuels appears to be very costly. Reference is made to the steady fall, year by year, in the railways' coal consumption "achieved mainly by technical improvements, electrification, and by greater use of diesel and diesel-electric locomotives." It is also noted that the power stations used $2\frac{3}{4}$ per cent more coal in 1953 but sent out about 6 per cent more electricity. Incidentally it is said that there was a sharp fall in gas sales in the last four months of the year so that the total sales for 1953 were lower than in 1952; this was reflected in decreased sales of coal to the gas industry.

ELECTRIC VEHICLE BUSINESS

Although last year there was a further substantial addition to the number of electric vehicles in service in this country the number of new registrations was lower than in 1952. It appears that the principal slackening occurred in the case of pedestrian-controlled types of which there were 9,353 in service at the end of last year. The decline was not so marked in the case of driven vehicles whose total number rose to 19,747; in fact the number of 12–16 cwt vehicles added was about the same as in 1952 and the addition of 16–20 cwt vehicles was actually larger. In this class it was the 1–$1\frac{1}{2}$ ton sizes which were not registered in so great a number as in 1952. The Electric Vehicle Association of Great Britain, whose annual report is dealt with in this issue, has set up a committee to study the possibility of expanding the Association's scope and membership and the establishment of a users' division is being considered. The "electric" has so many merits for local delivery work that its scope should be limitless. Much we think could be done by Electricity Boards, first by example and then by precept. There are too many petrol-engined vans running around labelled "Electricity" when electric vehicles would be equally suitable for delivery and service calls.

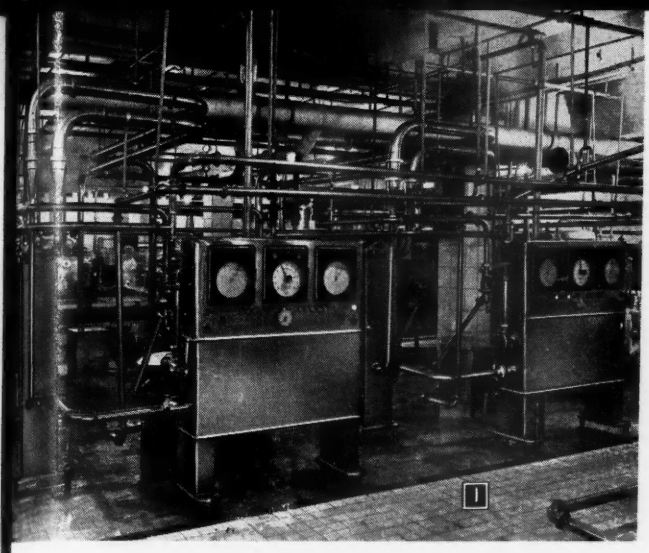
"SOUND TARIFF POLICIES"

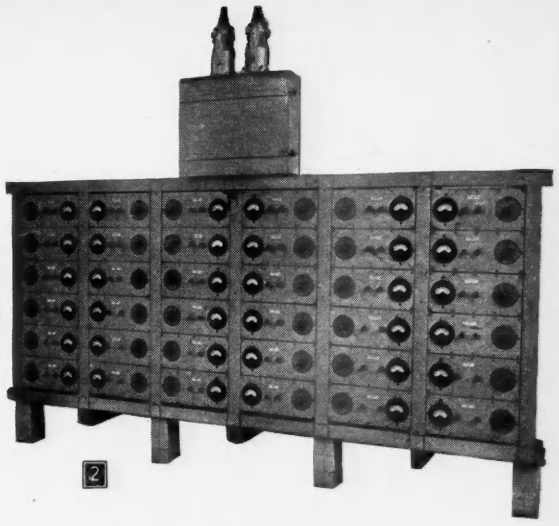
A group of ten back-bench Conservative M.P.'s has produced a study of industrial questions and of the relations between Government and industry.* It ranges over a wide field and inevitably deals with the nationalized industries and in doing so repeats a number of well-worn arguments. One of them is that an important part of the domestic demand (space-heating, water heating and cooking) could be satisfied more efficiently by gas and solid fuel than by electricity. Therefore the expansion of the electricity supply system is to be deprecated. In fact much space is devoted to damning electrical methods; the only merit conceded is that the industry consumes low-grade coal —but so, say the authors, can other large-scale industries. There appears to be no recognition of the essentiality of electricity to industry and the concomitant need for a balancing load to improve the supply system's load factor. Instead the authors favour "sound tariff policies" which, they say, would probably lead to an expansion of the consumption of gas for domestic uses at the expense of electricity, as well as encouraging the use of modern coke-burning appliances. The subsequent advocacy of the enforcement of a tariff policy by the Minister of Fuel and Power ("Government regulation") comes strangely from such a source. We are, however, in sympathy with the authors' views on the meeting of rural electrification costs. They believe that any deficit should be made up by an open subsidy "instead of wrapping up the truth by overcharging other consumers" as now seems to be the accepted method.

* "Change is Our Ally" (104 pp.), Conservative Political Centre, 6, Victoria Street, London, S.W.1, price 1s 6d.

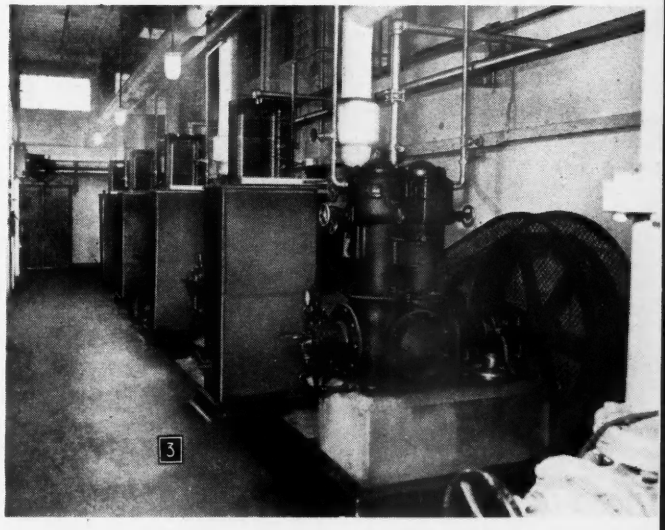
Next Week's Issue

The principal features of the 4th June issue of the "Electrical Review" will be a report (with photographs) of the Electrical Contractors' Association Conference at Scarborough and an illustrated pre-view of the Mechanical Handling Exhibition (Olympia, 9th to 19th June)





Modern Dairy and Bakery



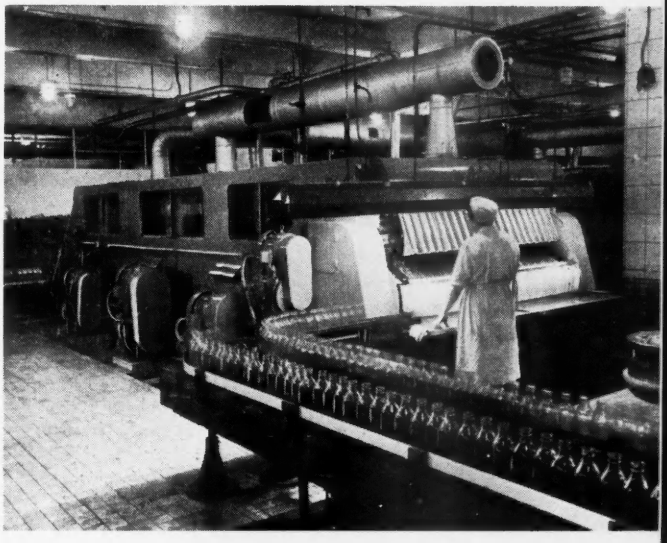
(1) General view of milk pasteurizing plant. (2) Control panel for pasteurizing, bottle washing, filling and capping plant. (3) Ammonia compressor plant

ON 2nd April (p. 614) we described the electrical installation at the rebuilt premises of Lewis's, Ltd., at Liverpool. To-day we propose to deal with another of the Lewis's organization's enterprises, a dairy and a bakery, operated under the name of S. Reece & Sons, Ltd. Though housed in the same two-storey building, which is a hundred yards or so from the main Lewis's stores, the dairy and bakery operate practically independently of each other.

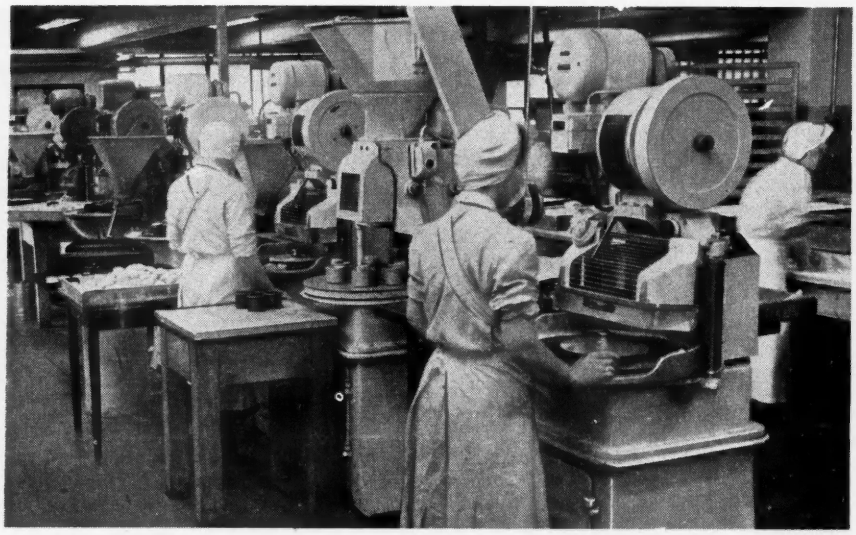
The raw milk, received from the farms in churns or tankers, is first weighed in one of the two Avery machines and then raised by means of Aluminium Plant & Vessel Co. pumps (driven by 3 h.p. Brook motors) to storage tanks on the first floor, T.T. milk being kept completely separate both here and throughout the subsequent processing.

From the bulk storage tanks the milk is gravity fed to an A.P.V. (Aluminium Plant & Vessel) pasteurizing plant where it is raised to a temperature of 162 deg F for 15 seconds before cooling to 38 deg F. A heat exchange system is employed to save fuel and provision is made for automatic recirculation of the milk should the temperature fall below that required for efficient pasteurization. Control panels, equipped with Negretti & Zambra indicating and recording instruments, visual and audible indicating systems, and push-buttons for all the totally enclosed direct coupled stainless steel pumps, enable the whole process to be supervised and regulated from a central point.

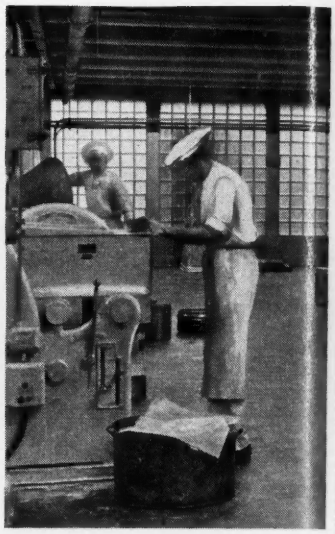
The milk is cooled by chilled water provided by means of four York Shipley $7\frac{1}{2}$in diameter ammonia compressors driven by Brook 70 h.p. motors equipped with Allen West control gear. The chilled water, the temperature of which is automatically controlled by means of Robert Maclaren & Co., Ltd., thermostats, is circulated by $12\frac{1}{2}$ h.p. pumps. Operating in conjunction with the compressors are six



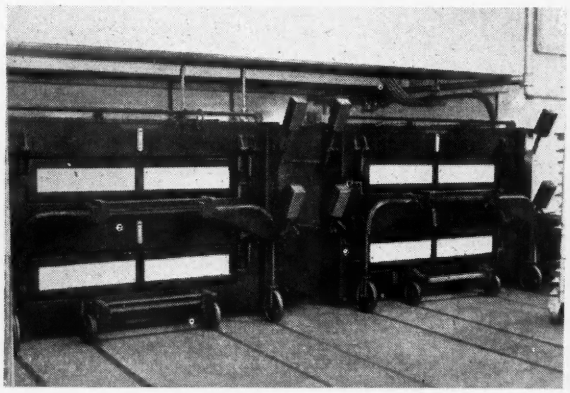
One of the bottle washers



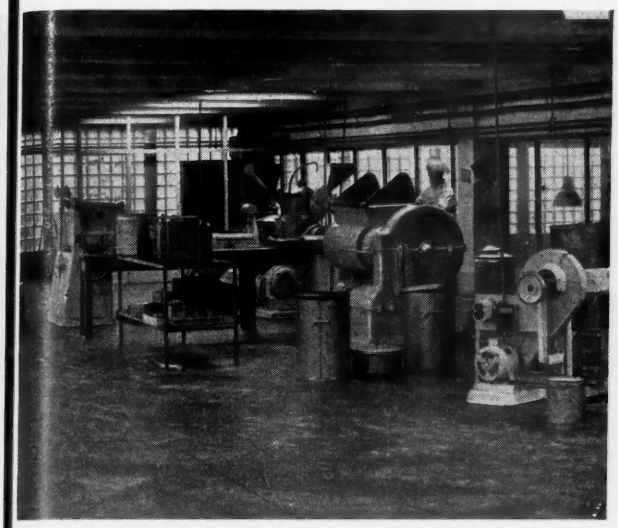
Pie and tart filling machines



General view of the first floor o



Left : Two of the four two-tier draw plate ovens. Right : Main switchroom. Below : General view of ground floor of bakery taken from first floor



floor of the bakery

condensers mounted on the roof, each driven by a 5 h.p. motor.

While the milk is being treated the bottles are being automatically washed, sterilized and dried in Dawson washing machines, which incorporate Holden & Brooke pumps driven by Brook motors. A conveyor system not only brings in the dirty bottles as they are unloaded from the crates but also carries them after washing directly to filling and capping sections. The four separate washing, filling and capping lines provided are each laid out to handle 12,000 bottles an hour, two 6,000/hr Albro fillers and Alka cappers being associated with each washer. The plant, which is normally in use eight hours a day, is controlled from a switchboard made up by Lewis's own Electrical Department and comprising " Isofuses," Allen West starters and ammeters.

The bakery, too, is furnished with a variety of electrical aids to assist in producing the cakes, pastries, pies, tarts, etc., in which it specializes. On the first floor, which is mainly engaged in the production of fancy iced cakes, there are three Morton and one Baker Perkins dough mixers, two Morton high pressure whisks and three Baker Perkins cake mixers; the motors for these machines range from about $\frac{1}{2}$ h.p. to $7\frac{1}{2}$ h.p. Also in this department are two G.E.C. double peel ovens (36 kW each). Maintenance of the high standard of hygiene demanded is facilitated by the use of a Fraser Tuson floor washer.

An Express lift links this room with the main bakery beneath where the preparation equipment comprises four Morton 80 qt mixers and a similar 20 qt unit, six Peerless & Ericsson pie and tart filling machines, a Baker Perkins " Integra " unit for weighing and dividing dough for buns, Morton and Baker Perkins dough brakes, two Baker Perkins depositors for cakes, a fondant heater and a chocolate kettle, the last two items being steam heated.

For baking there are four two deck draw-plate ovens (75 kW each) and one travelling oven (200 kW), all of G.E.C. manufacture. The travelling oven measures 7ft by 35ft, the speed of the chain conveyor passing through it being variable from 4in to 8ft a minute. It is thermostatically controlled with the aid of Cambridge instruments.

Cochran boilers supply the hot water and steam required both for space heating and process works, as well as for an Allen Bros. back pressure steam engine driving a 160 kW English Electric generator used for emergency electricity supplies and for reducing maximum demand. The control panel associated with this generator provides for the supply to be fed to any of three circuits required.

In the main switchroom on the first floor duplicate supplies from the Merseyside and North Wales Electricity Board are received at 6 kV and stepped down to 400/230 V by means of two 400 kVA and one 1,000 kVA English Electric transformers. The medium voltage switchboard incorporates a bus section switch and separate controls for the dairy, bakery and the refrigeration plant with interconnection with the emergency generator panel. " Nife " batteries are provided to operate the overload alarms.

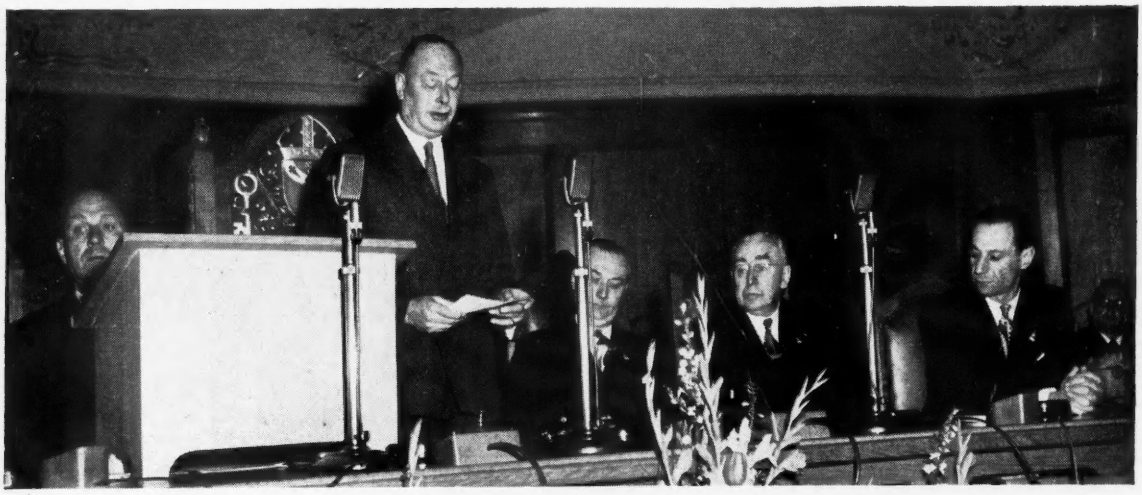
The architects were Sir Alfred Shennan and Partners. The engineering installation was carried out by Lewis's, Ltd., under the direction of the consulting engineer, Mr. Oscar C. Waygood, O.B.E., M.I.E.E., and their chief engineer, Mr. B. H. Lambert, AssociateI.E.E., all of whom we thank for their help in preparing this article.

Hydraulics Research

THE reports of the Hydraulics Research Board and the Director of Hydraulics Research are included in " Hydraulics Research 1953 " (published by H.M. Stationery Office for the D.S.I.R., price 7s 6d) with a description of the progress which is being made in the building of the Hydraulics Research Station at Wallingford and the research work which has been carried on in 1953. The first stage of the construction of the main hall has advanced during the year. A section of the hall having a floor area of 300ft by 200ft is expected to be completed and ready for use in early 1955. One of the models which will be constructed in the main hall will be a large model of the Severn estuary on which the effects of the Severn Barrage on the estuary can be studied. A pilot model of the estuary constructed to scales of 1/8,500 : 1/200 is being used for preliminary investigations to determine a satisfactory seaward limit for the large model.

At the request of the consulting engineers responsible for the construction of a thermal power station near the sea at Dekhelia, Cyprus, the Hydraulics Research Station carried out an investigation to find a way of preventing waves from entering a discharge channel for cooling water. Under certain conditions of wind and tide it was found that waves travelled up the channel, and broke at its upper end, the splashes from the breaking waves causing considerable corrosion of the steel structure of the station. After a series of experiments had been carried out on a model built to 1/9 scale a completely satisfactory remedy was found. It consisted of installing in the channel a weir block made of concrete. The standing wave caused by the weir acted as a barrier to incoming waves and prevented them from passing up the channel.

A sensitive current meter for measuring a wide range of water velocities in models has been developed at the Station. A small propeller seemed to be suitable for the purpose, provided that a means of timing could be devised which did not interfere with its rotation. This was achieved by supporting the plastic propeller on a stainless steel rod which formed one electrode of an electrical circuit. The second electrode was provided by a gold wire mounted radially to, and just clear of, the propeller. Under these conditions the movement of a foreign body (in this case each propeller blade) across the conducting face of the gold electrode causes a change in the conductance between the two electrodes. Two separate timing devices have been developed to use this principle. One is a dekatron counter and timer, the other an electronic tachometer. By these methods it is possible to measure water velocities as low as one quarter of an inch a second.



International Railway Congress

Papers Read at Church House, Westminster

TWO papers read at the International Railway Congress, which concluded last Wednesday, deal with protection of overhead lines, substations, locomotives and motor coaches against accidents of an electrical nature (overvoltage, overloads, short circuits and lightning).

One by Mr. T. S. Pick (chief electrical engineer, London Transport) covers practice in Great Britain, South Africa, New Zealand, India, the United States, Denmark and Sweden. He notes that all administrations operating a h.v. distribution system earth the neutral point either direct or through a resistance. Usually the resistance will carry the maximum fault current for 30 sec. Arrangements are made to disconnect transformers and rectifiers from the a.c. supply on sustained overloads caused by conditions such as a combination of loading increases which individually are insufficient to trip the d.c. track feeder breakers. Instantaneous overcurrent relays are often used to open the a.c. circuit breakers in case of a short circuit, but some railways adopt h.r.c. fuses in the rectifier anode circuits instead. At three Southern Region substations the blowing of an anode fuse trips out the a.c. breaker to prevent overloading of the remaining anodes.

Describing arc suppression systems for rectifiers, Mr. Pick mentions South African practice in the use of anode current relays to initiate this effect in the event of a backfire. At 13 Southern Region substations and on railways in South Africa, India, and Denmark instantaneous overcurrent relays operate arc suppression apparatus with extreme rapidity without tripping the a.c. circuit breaker. Numerous examples are mentioned of the use of Buchholz relays to protect transformers against overheating, and it is noted that British Railways have stated their intention of installing this additional protection on future equipments.

Water-cooled rectifiers may be shut down by thermostats in case of overheating, and examples are quoted from Denmark of operation of the thermostat bringing another unit into action. Only four of the eight administrations replying to the questionnaire reported protection against excitation failure. The Southern Region of British Railways states a preference for giving warning of such failure to the supervisory staff without shutting down the rectifier.

It is clear from the replies that parallel operation of substations is preferred by most railways, its advantages being considered heavily to outweigh the drawbacks, such as the necessity of intermediate circuit breakers when substations are fairly widely spaced, in case a fault at one end of a section fed by two substations fails to trip the breakers at the remote end. It is common practice to protect feeders and overhead contact lines with high-speed magnetically-held circuit breakers which discriminate between overloads and short circuits by a " rate of rise " characteristic to give lower tripping values for high rates of rise of current. Methods of protecting locomotives and motor coaches in general comprise fuses for short-circuit protection; and line switches with overload relay, or circuit breakers, for overload protection. Electrolytic and other forms of capacitor, spark gaps and chokes, and horn gaps or surge absorbers are mentioned as devices for protection against lightning and voltage surges.

In his conclusions Mr. Pick calls for improvements in detection of overloads, as many so-called overload protective devices are really only suitable for protection against faults. He stresses the need for bringing alternative loads, or systems of braking, into action rapidly to prevent voltage rises when regenerative braking is used. While electronic devices for this purpose are reported to have given good results on the Manchester–Sheffield line of British Railways, he considers that much longer experience is necessary before the arrangements can be accepted as completely satisfactory.

Mr. J. F. M. de Boeck, chief motive power and rolling stock engineer of the Belgian National Light Railways, covers practice on the Continent (except Scandinavia) and

The heading picture shows the Duke of Gloucester speaking at the first meeting of the International Railway Congress

in overseas territories administered by Continental countries. He notes widespread use of biased grids for arc suppression in rectifiers, but advocates the addition of high-speed reverse current circuit breakers on the d.c. side when capacities of 1,000 kW and over are concerned. Some use has been made of control grids as load limiters, but the principle is not being extended. Voltage limiters, on the other hand, are widely installed.

Practice with respect to high-speed circuit breakers in track or overhead line feeders, and parallel operation of substations, is shown to be similar to that recorded by Mr. Pick. Details are given of a Belgian system using polarized circuit breakers to minimize the length of the section from which power is cut off when tripping occurs. On the French National Railways interlock circuits in the telephone cables connect the circuit breakers at opposite ends of a section, so that all are tripped together and there is no risk of feeding into a remote fault. There has been satisfactory experience on three railways with a detector relay claimed to respond to fault or short-circuit currents of from a half to one-seventh of the normal peak current to which the circuit breakers are set.

Little divergence from standard practice is noted in protective equipment on locomotives and motor coaches. On the Italian State Railways the normal system of overload relays, arranged first to insert resistance and then open the line switches, is supplemented by a circuit consisting of a fuse and circuit breaker in parallel. When the circuit breaker trips, the traction circuits are earthed and the full line voltage is applied to the fuse, which cuts the short-circuit current cleanly and instantaneously. Ordinary, as distinct from high-speed, circuit breakers are generally considered adequate for voltages below 1,500. The author notes a trend on the French National Railways towards dispensing with overload relays on the ground that wheelspin occurs before dangerous currents are reached.

The author reviews various apparatus to provide safeguards against overvoltage or loss of braking effort when using regenerative braking. The Moroccan and Algerian railways have rotary-convertor substations on sections where regeneration is employed. No special equipment at rectifier substations is reported by any railway with locomotives equipped for regeneration. The single-phase 50 c/s Bas Congo–Katanga line in the Belgian Congo reports its decision, after investigation, that regenerative braking has no advantage to offer although its system includes a gradient of 1 in 80 extending for 19 miles. Regeneration has not been adopted on lines of the French National Railways electrified since 1942, although it is used on certain earlier sections with rotary-convertor substations. Mr. de Boeck agrees with this administration's comment that " regenerative braking is advantageous only when lines include a high percentage, in relation to their length, of long, steep gradients, on which it constitutes an efficient means of restraint whilst avoiding rapid wear of brake shoes; at the same time it permits a certain economy in electrical energy."

Remote Electrical Signalling

Centralized traffic control can be regarded as the equivalent in railway signalling practice of remote supervisory control for power distribution. Signals and points at numerous positions along a railway are controlled from one office by an operator who has a mimic diagram to show him the positions of trains and the setting of the points and signals at any moment. Similar apparatus can be used to control small signalling layouts on the fringe of a busy station area, enabling all traffic to be directed from one signal box. Electrical operation of points is not an essential feature of centralized traffic control (C.T.C.). Sometimes they are worked on site by hand after release of an electric lock by the controller; but this is included in many schemes and also in ordinary power signalling.

Three papers on these subjects were presented at the Congress. European countries (except Scandinavia) and their overseas territories were dealt with by Professor A. Dobmaier, director of the German Federal Railways; and Mr. J. Nogués, deputy manager, Spanish National Railways. Professor Dobmaier's paper was presented by Dr. Ing. H. Grunewald, chief officer, Central Technical Office, German Federal Railways. Mr. R. Sørvik, chief signal engineer, Norwegian State Railways, covered the United Kingdom, United States, Ceylon, Denmark, Finland, India, New Zealand, Norway, and Rhodesia.

Increasing Use of C.T.C.

It is noted that the use of C.T.C. is increasing, particularly on single lines where central control enables traffic to be regulated so that trains running in opposite directions can pass each other at loops without delay. There are important advantages in the system for double lines where traffic flow is such that at certain times both tracks can be used for trains running in the same direction. Here it provides increased traffic capacity without the laying of an additional track. Mr. Nogués describes the French National Railways installation at Dijon for reversible working of the two tracks between that station and Blaisy-Bas.

C.T.C. systems are mainly operated by coded d.c. impulses, but an a.c. inductive method is used in Germany. In the United States remote operation is effected at distances up to 284 miles with a d.c. system. Often a two-wire circuit carries all the control and indication impulses between the control office and outstations, but one type of installation has a three-wire circuit and effects coding by transmitting impulses over different combinations of wires. Remotely-controlled apparatus is operated from local power sources, batteries or mains, the C.T.C. impulses being used only for selection of the outstation, the apparatus, and the operation required.

Mr. Sørvik quotes the British Railways comment on C.T.C., which he considers representative of the views of most railways in Europe at the present time. This is to the effect that C.T.C. is generally more suitable in countries using the train despatcher system of traffic working, where it becomes economic when growing traffic necessitates extra signalling. In Great Britain the possibility of reducing signalling staff by C.T.C. does not justify such installations economically because the men displaced would still be required for other duties.

Electric point machine motors operate on a variety of d.c. and a.c. voltages between 20 and 220. All motors are reversible. Some three-phase machines are used in Germany and France. It is usual to provide for hand operation of the points in emergency. Sometimes the hand lever disconnects the electricity supply to the motor when released or moved, and in other equipment a fuse must be withdrawn or a circuit breaker tripped before hand operation is possible. Practice varies considerably in the matter of reducing the motor current at starting, and no provision for doing so is made in Belgium, Spain, France, Portugal, Finland, New Zealand, Norway, and Sweden. In Italy the point motor is started off load. In general, the starting currents range from 5 A to 12 A according to voltage, and the running currents from 3 A to 7 A. The motor current is cut off automatically by the operating mechanism when the points have moved fully. Experimental installation of three sets of points operated by hand-driven generator is reported by the Sudan Railways.

Maintenance of electrically operated points is stated to require between 12 and 14 days annually by British Railways, but in general the figures quoted to all the authors were between two and three days.

Radio Telephony on Railways

The Congress was the first of these meetings at which radio telephony has been a separate item on the agenda. Its application to railways was covered in two papers under the heading of "Radiophonic Communications in Railway Working."

Mr. S. G. Hearn, operating superintendent, London Midland Region, British Railways, and Mr. J. H. Fraser, chief officer, engineering (signal and telecommunications), British Transport Commission, dealt in a joint paper with practice in the United Kingdom, Burma, South and East Africa, India, Malaya, New Zealand, New South Wales, Norway, Sweden, Indonesia, and Finland. In general the countries named used frequencies in the v.h.f. band, 70–80 or 150–180 Mc/s; or in the higher end of the m.f. band, 1·5 to about 15 Mc/s. The most extensive use of radio telephony is made in the United States. Radio telephony sometimes supplements radio telegraphy for communication between fixed stations. It has been adopted widely in the United States for communication between the locomotive and brake van of long freight trains, but Norway was the only other country which reported that it had followed this procedure. Experiments in this direction in Great Britain encountered difficulty in receiving satisfactory messages on the footplate of a locomotive at speed, but it is considered that this disability could be overcome by further improvement in various new types of equipment.

The United States also employed radio communication between crews of moving trains, and the emergency in Malaya had led to a similar application. Communication between fixed points and moving trains has proved a useful aid to traffic working in the United States. A small installation of this type was operated by the East African Railways on a 133-mile branch with no landline facilities.

Radio was being used on a growing scale in marshalling yards and terminal areas, particularly in the United States. In Great Britain the only example was at the Whitemoor up yard of the Eastern Region. Only one case was noted, however, where radio had superseded existing forms of communication in connection with train and yard working, instead of being supplementary to them, this example being a marshalling yard in Sweden. The authors saw a useful field for radio telephony in civil and signal engineering work, where it permitted closer co-ordination and fuller utilization of men, materials, and equipment.

Compactness is essential in accommodating aerials on locomotives. A design for a frequency of about 170 Mc/s was described, consisting of a 2·5in metal tube with a disc top, having an overall height of about 11·5in. It was suggested that railways having difficulty in locating aerials on locomotives should experiment with the u.h.f. band, particularly as such frequencies assisted communication in tunnels.

Portable transmitter-receivers were carried by the staff in some railway yards, making it imperative that the aerials should not impede their movements. In one equipment the aerial was incorporated in the carrying strap, and a recent U.S.A. transmitter, small enough to hold in the hand, had its aerial arranged as a loop which could be hooked over the arm for transport.

Power outputs of v.h.f. equipment in railway service ranged between 20 and 100 W for fixed stations, and between 5 and 25 W for mobile units. Walkie-talkie sets usually had an output power of between 0·1 and 1 W. Equipment installed on locomotives could often be supplied from steam turbo-generators. Accumulators, charged *en route* or at the depot, were normally used for brake van installations. The authors hoped that some recently introduced types of accumulators and dry batteries would help with the problem of saving weight and space in walkie-talkie supplies, although they were rather costly at present. They suggested that transistors might make a useful contribution to the problem by reducing battery requirements.

Little interference was reported from electrical apparatus, but it was thought that electric traction might prove troublesome at 80 Mc/s and below. The Association of American Railroads reported that the use of v.h.f. with frequency-modulation has virtually eliminated electric traction and similar interference.

European countries not dealt with in the above paper were covered by Dr. Ing. J. Frischauf, chief officer (telecommunications), Austrian Federal Railways. His conclusions generally confirmed those already stated, but certain differences of policy and practice were brought out. The German, French, and Italian Railways, for example, were studying radio links for passenger use between trains and the public telephone network—a service provided on certain lines in the U.S.A., but generally at a financial loss to the railway.

Spanish System

The Spanish National Railways proposed to establish a radio telephone network connecting Madrid with seven operating divisions, and providing communication within the divisions themselves. Similar systems were already operating in Italy, one of which links nine control points for electric traction supplies. Most of the 14 managements which furnished data used radio for communication between permanent way gangs and the traffic offices responsible for the sections where they are working. Dealing with the effects of tunnels and topographical features on screening radio signals, the author mentioned trials on the Italian State Railways with 520 Mc/s equipment which have given good results in reducing this difficulty. The Belgian Railways have experimented satisfactorily with communication in tunnels between locomotives at the front and the rear of a train, using frequencies of 150 Mc/s and upwards. Reference was made in this connection to carrier current telephony via the overhead contact wire on electrified railways.

Neither report had brought to light any railway applications of radar as generally understood, although the contribution by Messrs. Hearn and Fraser mentioned an adaptation of radar principles in the United States which was used for measuring the speed of wagons in a hump marshalling yard.

In his conclusions Dr. Ing. Frischauf stressed the importance of reliability in railway installations and directed attention to the need for withstanding mechanical stresses and dirt, and to providing adequately for heat dissipation. He noted increasing use of frequency-modulation, and stated that growing congestion of the v.h.f. band was causing some managements to tighten up their requirements in respect of the frequency-stability of radio apparatus.

The German Railways were reducing their f.m. channel spacing from 100 to 50 kc/s. Decimetre waves seemed to be the most suitable for communication in tunnels, and some railways had already reserved channels in the decimetre and centimetre bands. The author recommended administrations in other countries to do the same.

E.A.W. Conference

Rural Electrification Discussed

THE theme of "Electricity and the Countryside" attracted over 500 delegates from all over the country, as well as from Holland, to the twenty-ninth annual conference of the Electrical Association for Women held at Torquay last week. At the opening session on Tuesday the Dowager Lady Swaythling, president, took the chair and a civic welcome was given by the Mayor of Torquay, Alderman P. T. Read. A welcome on behalf of the E.A.W. branches of the South Western Area came from Miss E. S. Todd, president, Torquay Branch, deputizing for Mrs. V. F. Gresham, founder-president of the Branch, who was indisposed. Greetings from the Dutch E.A.W. were brought by Miss Bellaar Spruyt and Mrs. H. J. Mansholt, who presented Dame Caroline Haslett, director of the E.A.W., with a table lamp.

Introducing the subject of rural electrification, Mr. S. F. Steward, chairman of the South Western Electricity Board, declared that the social and economic benefits which followed an electricity supply far outweighed its cost and he believed it a public duty and a national necessity to see that electricity was extended throughout the countryside as fast and as far as possible. The basic need was to increase the production of food in this country to reduce our reliance upon imports.

To secure more production from existing farms and to reclaim neglected land electricity was essential. It could bring labour saving devices to the farmer, and it could improve the quality of milk and help to overcome the hazards of the weather. Furthermore, the use of electricity to improve the amenities of the countryside would arrest the drift from the land. In the first six years of public ownership the fourteen Area Boards had taken electricity supplies to 60,000 farms and 350,000 other rural premises. But for electrical development to be self-supporting the revenue received must provide a sufficient margin to cover the capital costs. The problem was most acute in areas with a preponderance of rural development without an industrial load to balance it.

It was the Government's intention and the policy of the electricity supply industry to treat rural electrification as a national problem. It was therefore proposed to finance uneconomic schemes from the overall resources of the industry and for some years, at any rate, not to seek any outside help or Government subsidy. The ultimate objective was the connection of all premises within reach of the distribution system which meant about 85 per cent of all farms and almost every village and hamlet. It was hoped to complete the job over most of the country by 1968. The immediate national programme provided for supplying electricity to a further 60,000 farms and 260,000 other rural premises within the next five years.

It was quite uneconomic and unsound to devote capital and effort to the extension of power lines into the countryside if they were not reasonably loaded and used over as long a period of the day as was practicable.

Mr. Steward gave a number of examples of actual savings achieved on West Country farms by the substitution of electricity for other fuels. In one case a farmer was saving as much as £81 a year by using electricity for large-scale steam raising; another had cut his fuel bill by £21 a year after adopting electric machine milking.

The industry provided a first-rate advisory service throughout the country. It was now up to the rural consumers themselves, and farmers in particular, to see that the full benefits of this great electrical service were applied in the national interest.

Lady Farmers' Views

Lady Carew Pole, chairman, South Western Electricity Consultative Council, gave instances of personal experiences of the benefits of using electricity in pig rearing and also for cooking. She urged the removal of purchase tax from water heaters. First-hand information on what electricity meant to the farming community was given by Mrs. Elizabeth Trump, a farmer's wife. Mrs. Carrie, a farm director, pointed out that there were still more farms without electricity than with and this was one of the reasons farmworkers were leaving the land at a rate of 30,000 a year. She thought it would pay Area Boards to give really attractive tariffs for the right load.

Some of the research being carried out in connection with

Left: Mrs. Carrie, Lady Citrine, Mrs. E. Trump, Mrs. A. B. Lewis, J.P., Mrs. A. T. Dover and Miss Bellaar Spruyt. Right: The Dowager Lady Swaythling, Mrs. H. J. Mansholt, Dame Caroline Haslett and Mr. S. F. Steward

Lady Astor and Mrs. A. L. Hayes (Area Organizer Midlands and East Midlands)

Mrs. J. B. Christie (Chorley & District Branch), Mrs. I. Wright Roberts, Mrs. E. Garrett and Mrs. B. A. Evans (all of the North Wales Branch)

electricity in horticulture was outlined by Dr. Daphne Vince, lecturer at Reading University.

Opening the annual general meeting on Wednesday, Lady Swaythling, who again presided, read a telegram of greeting which had been sent to Her Majesty the Queen and the reply. She paid a warm tribute to the work of Dame Caroline Haslett and congratulated Miss Vera Norvick, assistant secretary, on her election as a member of the Royal Institution.

In the annual report of the National Executive Committee, presented by Dame Caroline, the two themes of the Coronation and women's part in an expanding electrical programme were apparent through all the E.A.W. activities and were marked in a variety of ways. As a contribution to the national investigation into atmospheric pollution, the E.A.W. had endeavoured to assess its effects on the household laundry.

Training and examinations in electrical housecraft continued to expand and in 1953 there was a 25 per cent increase over the previous year in the number of home workers' certificates awarded. The Councillor Miss Walter rose bowl was again won by the County Technical School, Tonbridge.

Nine new branches were formed during the year: Northampton; Evington Parks, Leicester; Redditch; Hereford; Peterborough; Taunton; Stirling; Eastbourne; and Bromsgrove. Area conferences were held throughout the country and a very successful "Electrical At Home" was organized by the South-East London Branch at Lewisham. Last year saw the organization of a record number of electrical courses of all kinds. Activities had continued with the object of convincing the Treasury that all purchase tax on domestic labour-saving equipment should be abolished.

To fill the vacant six places on the National Executive Committee the following were elected: Mrs. Mark Fraser, Miss N. Kenyon, Miss N. Shaw, Mrs. H. F. Truman, Mrs. N. G. Wallace and Mrs. C. Wootton. Lady Swaythling presented past officers' badges to the retiring chairman, Mrs. A. T. Dover, and to the retiring hon. treasurer, Mrs. A. B. Lewis. She also presented the Lady Hughman Challenge Bowl and replica to the winner of the golf competition, Mrs. Clarkson (London).

"Women and the World"

At a subsequent session the chair was taken by Nancy Viscountess Astor, C.H., first president of the E.A.W. and president of the Plymouth Branch, and as it was her birthday Dame Caroline presented her with a hairdryer on behalf of the E.A.W. members. An address by Mr. St. John Ervine, the well-known author and playwright, had as its subject "Women and the World." Declaring that the past 50–60 years had been the most remarkable in the history of mankind, he said that of all the changes that had taken place the most striking had been in the status of women. He thought that in the future we should have to concern ourselves not with mechanical but spiritual things and in this women had a great responsibility.

On Tuesday evening there was an official reception and dance at the Town Hall, given by the Mayor and Corporation of Torquay. The following evening there was a party given by the E.A.W. South Western Area Branches, the entertainment including "Kitchen Magic" by "Bon Viveur" (John and Phyllis Cradock).

To conclude the conference on Thursday there was a choice of seven visits designed to show the benefits of electricity in farm and village; in agricultural college and marine biological laboratory; and in traditional and modern industry. They were to Dartington Hall, Totnes; the village and farm of Ashcombe, near Dawlish; the South Western Electricity Board's billing centre, Plymouth; the Bovey Tracey Pottery Co., Ltd.; Tecalemit, Ltd., Plymouth; the Seale-Hayne Agricultural College, Newton Abbot; and the Marine Biological Laboratory and Aquarium, Plymouth.

Miss J. Whitgift (Simplex) and Miss M. Tanner (B.E.A) and (left) Mr. and Mrs. St. John Ervine

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

St. Lawrence Power Cable

MY attention has been drawn to the leading editorial of your 16th April issue, and more particularly to a reference to the large St. Lawrence River submarine power cable scheduled for installation this summer stating that it " uses a second British design (external compression)." I am sure from my acquaintance with the fine British engineers I number among my friends, that those of the British Isles would be most anxious to extend full credit to engineers in other parts of the world and be most meticulous that no wrong inference could be drawn, particularly from statements in publications as influential and widely read as the *Electrical Review*. This prompts me to comment on your editorial.

While one must pay tribute to British engineers in developing several ingenious methods of applying external high pressures to impregnated paper cables in order to take advantage of the effect of these pressures in suppressing destructive ionization, I do not believe that the idea is exclusively British. All literature to which we have access indicates that it would be difficult to pin down its origin to any particular country. Great credit however must go to Messrs. Hochstadter, Vogel and Bowden, for their publishing of means to employ economically the advantages of the principle in land type cables.

In the case of the St. Lawrence River cable, it is appropriate to point out the following:—

(1) The concept and decision of transmitting this large bulk of electric power at high voltage, a distance of somewhat in excess of 30 miles by submarine cable, was completely Canadian.

(2) The designing and manufacturing of the cable decided upon was Canadian.

(3) The availability of external pressure was purely fortuitous (the depth of water being up to 1,200ft maximum). The decision to employ this fortuitous source of pressure toward increasing the unit stress on the insulant (by reducing the thickness of insulation in the deep water portions) was purely Canadian in so far as this project is concerned.

(4) The advice as to practicability of deep water laying, the methods of doing so, and the actual laying are British.

It is interesting to point out that the Vancouver cable referred to in your editorial is not the *same* design as the English Channel trial cable. It differs in the adoption of an element of design followed in all Canadian designed and manufactured gas pressure type cables (two such installations are in successful operation in Canada—one in Vancouver), namely the incorporation of a definite gas channel in the centre of the conductor. One would be justified in concluding that the sea trials revealed the necessity for adopting this important element of design.

Canadian engineers do not claim the invention of this essential element. In fact, the well-known Fisher-Atkinson series of patents (1920–1927) covering the basic idea of internal pressure type cable, specifically mentions this desirable and usually essential structural element. So far as we are aware, the first working applications of this conductor gas channel on any commercial high voltage installation were on this continent.

While on the subject of the Vancouver cable, might I be permitted to refer to an unfortunate inference being drawn from statements appearing in trade publications and house organs in Great Britain, that the Vancouver cable is the largest submarine power cable in the world. It is quite possible, although I have not checked on the details, that it is of the largest diameter, but the statement would be quite incorrect from the viewpoints of distance, total weights, depth of water, or of value. The St. Lawrence River project exceeds it greatly in all these respects.

You will understand that I have construed " British " in the sense commonly understood on this continent, namely as pertaining to the British Isles. Possibly this is a misunderstanding and that a broader term was intended, in which case I beg your indulgence.

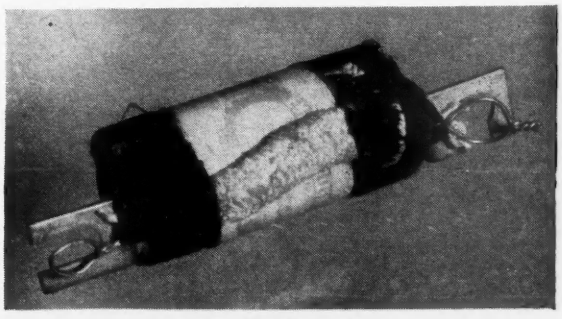
This letter is written to promote and preserve the fine spirit of cordiality existing between two groups of progressive and justifiably proud engineers—those of Great Britain and those of Canada. Unjustified claims, or statements which might be interpreted as such, tend toward irritations against which it is most important to guard.

O. W. TITUS,
Vice-president and General Manager,
Canada Wire & Cable Co., Ltd.

Toronto.

Rewired Cartridge Fuse

THE practice of rewiring a h.r.c. cartridge-fuse link is rightly deprecated as dangerous. Most electricians would repudiate the suggestion that they might do such a thing,



A " repaired " h.r.c. fuse

and all would strenuously deny ever having done it. Fuse- and switchgear manufacturers, often blamed for failures due to this method of effecting a " temporary " (?) fuse repair, know better.

The illustration shows a 60 A cartridge bridged by a twist of wire in an asbestos tube lashed to the ends of the cartridge body by black rubberized tape—it was taken from a fused switch in a switchboard installed for a public authority in the London area.

STANLEY W. BOWLER,
Varilectric, Ltd.

London, S.E.15.

Resuscitation Methods

I WAS very interested in the article on this subject by Mr. Swann in your issue of 14th May. Dr. F. C. Eve, M.D., F.R.C.P., the inventor of the Eve rocking method

of resuscitation, who died in 1952, was my brother-in-law and I had many discussions with him on this subject. He supported the view of probable efficacy of counter-shock mentioned in Mr. Swann's article as I remember he told me that during the late war he had recommended to the Air-Sea Rescue authorities that unconscious airmen in the sea should be unceremoniously hoisted out of the sea and dumped on to the deck of the rescue vessel. Speed of rescue and warmth after rescue were very important factors for recovery.

Dr. Eve claimed by means of careful tests that for the rocking method at 10 rocks per minute through 90 deg the tidal air produced was 580 c.c. against 340 c.c. for the Schaefer method.

Everyone employed in the electrical industry should know how to act immediately when confronted by an emergency where someone has been rendered unconscious by electric shock. The following information may be helpful:—

(1) Start Schaefer (or Holger Nielsen) artificial respiration instantly.

(2) Call for Riley rocking stretcher to be brought alongside.

(3) If rocking stretcher is not available improvise one by getting helpers to obtain a ladder about 7ft long or a door or board. A trestle or plinth 3ft high is necessary to allow the improvised stretcher to rock 45 deg each way.

(4) Put the patient face down on the stretcher or ladder and lash his ankles and wrists to top and bottom.

(5) Start rocking with the patient's head down and go through 90 deg (i.e. 45 deg below and 45 deg above the horizontal line).

(6) Continue rocking 9 or 10 complete rocks (cycles) per minute as follows:—4 seconds head down and 3 seconds feet down until breathing returns.

It would be very useful if your readers would give experiences of improvised apparatus and raise interest in this vital subject through your columns.

Glasgow. C. S. BUYERS, M.I.E.E.

[The *Electrical Review's* new instruction sheet for electric shock resuscitation emphasizes the need for prompt and continued action. The Holger Nielsen system is employed and reference is made to the use of a rocking stretcher if one is immediately available.—Editors, *Electrical Review.*]

132 kV Wood-Pole Line

THE new transmission line of the British Electricity Authority, described in your issue of 23rd April, is, despite "Scotia's" letter in the *Electrical Review* of 14th May, the first 132 kV line in this country, Scotland included, to employ wood-pole supports throughout its entire length.

"Scotia" is mistaken in thinking that the Dundee to Aberdeen line is comparable, since this line for some reason makes use of steel towers at all angle positions.

W. A. E. FEATHERSTONE, A.M.I.E.E.

Walton-on-Thames.

Economies of Railway Electrification

IN your special issue of 21st May, dealing with electrification of railways, your contributors Messrs. Cock and Smart have made out an excellent case for the conversion of steam railways and Mr. Cock particularly asks "Can we afford *not* to electrify our railways?"

Many years ago I conducted an exhaustive research in Europe and America on railway electrification and although since then much advance has been made in world electrification schemes, the report of the Super-power Committee appointed by the United States Government some time after the first world war gave interesting figures of the economies of railway electrification in the United States. Part of that report may be worth summarizing to-day for British readers:—

"Regarding railway electrification we find there are twenty class I railways included in the super zone. These are divided as follows—first track 14,500 miles, second track 6,500 miles, total trackage including yards and sidings 36,000 miles. There are a total of 10,000 steam locomotives of which 44 per cent are freight, 29 per cent express and passenger and 27 per cent switching. The total annual railroad coal consumption was 19 million tons—apparently one third of this mileage can be economically electrified including the greater part of the double track.

The above 33 per cent of mileage will carry more than 50 per cent of the traffic and by preferential arrangement of routes probably 60 per cent of the total traffic can be put over this mileage. Through the electrification of the above mileage a fuel saving of 6 million tons of coal per annum will be effected, and added to this saving there will be $50 million annually as a difference in favour of electric versus steam engine repairs and maintenance."

*London, S.W.*19. ARTHUR R. NISSER, D.I.C.

Contractors' Conference

NEXT Monday (31st May) the annual conference of the Electrical Contractors' Association and Allied Associations opens at Harrogate. In the morning there will be a meeting of the Council of the Associations and during the day delegates will be registering at the Majestic Hotel. Mr. S. L. M. Barlow, the president, will hold a reception at the Royal Hall in the evening at 9 p.m. and a dance will follow.

Tuesday's proceedings at the Royal Hall will open with a civic welcome to which the president will respond, afterwards delivering his presidential address. The rest of the morning will be occupied by the reading and discussion of a paper by Mr. J. R. Halliwell dealing with "Business Opportunities for Electrical Contractors." There will be no business session in the afternoon; a visit has been arranged to Newby Hall, an attractive Yorkshire country house, and, as an alternative there will be a tour of the Yorkshire Dales.

The annual general meeting will take place on Wednesday morning at the Royal Hall. At the afternoon session Messrs. A. H. Olson and C. J. Veness will present a paper on "Lighting Applications: The A.B.C. and L.S.D.," and a discussion will follow. Then the new president will be installed and will give a short address.

The final function will be a smoking concert and dance at the Royal Hall on Wednesday evening.

I.E.S. Liverpool Centre

THE suggestion that the Illuminating Engineering Society should arrange with the B.B.C. to give a series of illustrated talks on the best ways to utilize lighting in conjunction with television was made by Mr. W. Gilchrist (retiring chairman) when he presented his report to the annual meeting of the Liverpool Centre of the Society on 11th May.

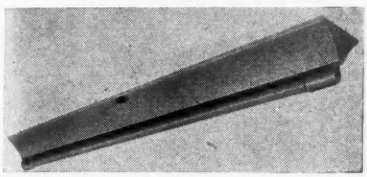
Mr. Gilchrist said that there was confusion in the minds of the public as to how lighting should be used with television. It would be interesting if a place was found in television programmes for talks of this type, and the I.E.S. was the obvious organization to undertake this work.

The secretary's annual report stated that membership was 124, a reduction of five compared with the previous year and that the average total attendance at meetings was thirty-five. Collections at meetings on behalf of the E.I.B.A. had realized £4 15s 1d. Officers and new committee members were appointed as follows: Chairman, Mr. G. W. A. Illingworth; vice-chairman, Mr. G. L. Butler; treasurer, Mr. W. T. Trace; secretary, Mr. J. L. McCauley; assistant secretary, Mr. F. J. Burns; auditor, Mr. A. V. Milton; and committee, Messrs. M. G. Lockwood, G. E. Shepherd and J. S. Buck.

NEW ELECTRICAL EQUIPMENT

Fluorescent Fittings

A NEW fluorescent lighting fitting, using the " Seagull " reflector, is available from the EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, London, W.C.2. There are two models, for one or two 5ft 80 W lamps. Constructed of heavy gauge sheet steel and finished in high-gloss white stoved



" Ediswan Seagull " fluorescent lighting fitting

enamel, the fittings consist of a reflector and channel of special design housing the control gear. Fixed white plastic b.c. spring-loaded lampholders are fitted with retractable end shields to facilitate re-lamping and an earthing clip is incorporated. Two keyhole slots are provided for ceiling fixing on 42in centres.

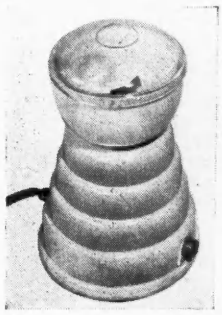
Coffee Mill

HILLMAN ELECTRIC MOTORS, LTD., 2/3, Northwold Road, Stoke Newington, N.16, are manufacturing a coffee mill for distribution in the home and overseas markets. It is driven by a $\frac{1}{10}$ h.p. universal motor and attains a speed of 16,000 r.p.m.; it is produced for the following voltages:—32, 100–110, 127–130, 160–200, 200–220 and 230–250, at 50–60 c/s. Operation is by press button and enough coffee for ten cups can be ground in 10 sec.

The attractively designed case is produced in pastel shades, and the cap is transparent, enabling the user to watch the progress of the milling. Dimensions are 7in high and 4½in base diameter.

The mill can also be used for grinding rice, nuts, bread, lentils, sugar and lump salt. The price is £4, plus 15s purchase tax in the United Kingdom.

Hillman coffee mill



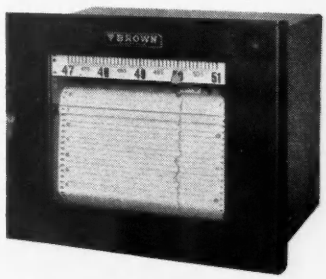
Food Mixer

The latest addition to the range of food mixers manufactured by KENWOOD ELECTRICS, LTD., 26, North Audley Street, London, W.1, is the Kenwood " Major." Mixing bowls are of heat resisting glass and the capacity ranges from six to twenty quarts. The bowls are mounted on a slide inside the white enamelled cabinet at a convenient height for adding ingredients by means of a stainless steel chute. A special mincer attachment is accommodated in a power outlet on the front of the cabinet while a third outlet in the top is designed to drive a liquidizer attachment. The attachments available are a dicer, grater, shredder, potato peeler, puree-maker, sieve, coffee-grinder and juice-separator. The retail price is £37 10s.

Wide-Chart Frequency Recorder

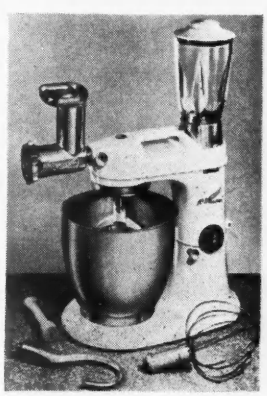
A twelve-inch strip chart frequency recorder for 50 c/s operation is now being made at the Scottish factory of HONEYWELL-BROWN, LTD., 1, Wadsworth Road, Perivale, Greenford, Middlesex. Based on the " continuous balance " principle of the company's " Electronik " potentiometer, and constructed so that interchangeability of parts and trouble-free operation keep maintenance costs to the minimum, the recorder is of good appearance and is designed to meet all the requirements of central station power systems.

In addition to its large and easily readable indicating scale, and the obvious advantage of the wide chart, the recorder is available with an 18 or 30 sec pen speed, according to requirements. It offers linearity over a wide range, has an accuracy of plus or minus 0·01 c/s, which is independent of the harmonic content of the line voltage, and its response is unaffected by ambient temperatures. The frequency portion of the measuring circuit may be connected to a low burden line, while the rest of the instrument receives its power from the normal supply.



Above: Honeywell-Brown 12in chart frequency recorder

Below: Kenwood " Major " food mixer

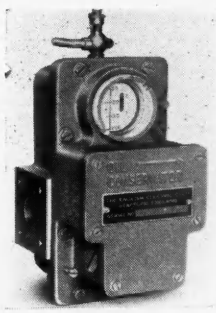


Buchholz Relays

An improved design of Buchholz-type gas-actuated protective relay, developed by the ENGLISH ELECTRIC CO., LTD., Stafford, has recently been approved by the B.E.A. for use on oil-filled transformers. Sizes are available for 1in, 2in or 3in pipework.

The relay employs bucket-type operating elements so that the transformer can be vacuum-treated without damaging the relay, and faulty operation caused by punctured floats is prevented. Two operating elements are contained within the casing, the upper element operating an alarm when a certain volume of gas has been collected owing to an incipient fault, and the lower element operating to isolate the transformer either on complete loss of oil in the conservator and relay, or when a more serious fault causes an oil surge. The bucket-type operating elements give positive operation, and careful design has ensured that operating values for steady flow and sudden surge are approximately the same; the relay can, therefore, be used with confidence on transformers having forced oil cooling, because greater surges caused by starting the circulating oil pump can be tolerated without inadvertent tripping.

A novel hand-operated testing device enables the electrical alarm and tripping circuits to be checked rapidly.



English Electric Buchholz relay

VIEWS on the NEWS

By REFLECTOR

WHAT I believe to be a new manifestation of the competition between engineering concerns for suitable recruits for training appeared in the *Manchester Guardian* last week. It began with a full-page advertisement by the Joseph Lucas Organization which was followed on subsequent days by similar announcements by the United Steel Companies, Ltd., and the Metropolitan-Vickers Electrical Co., Ltd. In each case the advertisers set out the facilities for training and the opportunities for advancement which they offered to would-be technicians and engineers. Metrovick made a particular point of the stability of employment with the company. It was said that six of the seven executive directors of the company were ex-apprentices as were about 70 per cent of the departmental heads. Older men may well envy the younger ones who are given such opportunities and such favourable conditions as those now open. Surely it can only be ignorance of these facilities (which the advertisements are designed to remedy) which causes a shortage of willing recruits to the engineering industry.

* * *

Electricity consumers can seldom understand the room-charge basis which is employed in the tariffs of supply authorities. In Ireland, as in this country, there are constant protests about the inequitable incidence of such tariffs. At a recent meeting of the Senate a member quoted the complaint of one consumer who said that the new system would double his two-monthly bill. There is a little confused thinking in his further remarks, although I can see a certain substance in his grievance:—

> " Because I cannot get a smaller house, I have to pay the electricity rate of an eight-room house. My nearest neighbour pays the rate of a four-roomed house, although, with electric heaters, washing machine, etc., he uses three times as much electricity as I do."

* * *

Protests are being made by church authorities in various parts of the country at the rise in their electricity bills caused by the introduction of new tariffs. On the face of things it would seem that as the consumption in churches is largely off-peak they should receive special consideration. According to the *Manchester Evening News* a spokesman of the North Western Electricity Board says that churches are given special off-peak terms, in common with other consumers with similar loads. If the report is accurate, he went a little far, I think, in saying that churches " must be regarded as commercial concerns just like public-houses and offices."

* * *

Having regard to the usual attitude of Electricity Boards to prepayment meters I am surprised to learn of a case in which a consumer alleges that he was told that he had to have a slot meter after delaying the payment of an account. The statement appeared in a letter to the *Bristol Evening Post* but there was a footnote saying that the South Western Electricity Board *encourages* a consumer to use a slot meter when he is in arrears. Otherwise he is asked for a deposit equal to two quarters' accounts " to safeguard the interest of other consumers." Interest at 4 per cent is paid and the deposit is returned when the consumer leaves the premises or if his bills are paid promptly over a period.

* * *

A speaker at a gas sales and service conference last week said that shops for selling gas appliances should look as though they were designed for the purpose and not like " town halls, Taj Mahals, or offices for registering births and deaths." I cannot recall coming across any gas showrooms answering to any of these descriptions but I have seen, between Torquay and Paignton in Devon, a gasworks camouflaged as a sort of late medieval castle. Somewhere or other I have also seen some electricity showrooms in a Tudor building and I must say that even if anachronistic they looked very handsome.

* * *

At Laxey, in the Isle of Man, radio dealers have called upon the Tynwald to do something about interference by the Electricity Board's system with radio and television. One dealer said, reports the *Isle of Man Examiner*, that interference from transformers was largely the trouble. " At night they are lit up like the Villa Marina," he said. I have heard of severe overloading of transformers in this country—instances of alleged cooking of food on them by substation attendants—but nothing so bad as this.

* * *

To-day's Cinema mentions the possible confusion of the B.E.A. with the Cinematograph Exhibitors' Association when the Authority's title, and initials, are altered. It says, however, that the Association, which speaks for the fifth largest industry in the country, is not worried although it quotes the following rather unkind remark of the Association's general secretary:—

> " If all the letters from dissatisfied customers of the Electricity Authority reached our address, it might create a serious postal position."

* * *

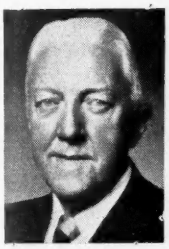
Eighty years ago the *Electrical Review* drew attention to the growing interest taken in electrical science by the Japanese. This was in a reference to the calendar for the 1873–74 session of the Imperial College of Engineering, Tokei, sent to the *Review* by W. E. Ayrton, then Professor of Natural Philosophy in that University. It was noted that Professor Ayrton's province included instruction in magnetism, electricity and telegraphy. Later he held the chairs of electrical engineering at the City & Guilds of London Institute and the Central Technical College and he was President of the Institution of Electrical Engineers in 1892. Ayrton was co-inventor with Professor John Perry of many electrical measuring instruments, and his wife Hertha Ayrton was the first woman member of the Institution (1899) and the only one until the admission of a lady student in 1916. Mrs. Ayrton gained her membership for her researches into the electric arc.

PERSONAL AND SOCIAL

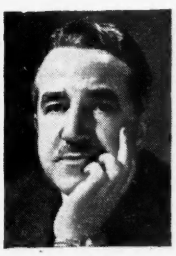
News of Men and Women of the Industry

Sir Alexander Roger, K.C.I.E., has announced his intention of retiring from British Insulated Callender's Cables, Ltd., of which he has been chairman since the amalgamation of British Insulated & Helsby Cables, Ltd., and Callender's Cable & Construction Co., Ltd., in 1945, immediately after the annual general meeting of the company on 16th June. He will be succeeded as chairman by **Mr. W. H. McFadzean,** C.A., deputy chairman and chief executive.

Sir Alexander was born in 1878 and was educated at Robert Gordon's College, Aberdeen. He joined the board of British Insulated & Helsby Cables, Ltd., in 1918 and was elected chairman in 1930. He is chairman of the Automatic Telephone & Electric Co., Ltd., the Telephone & General Trust, Ltd., and other companies, and is vice-president of the Federation of British Industries.



Sir Alexander Roger



Mr. W. H. McFadzean

Mr. McFadzean has been connected with B.I.C.C. and the former B.I. Cable Co., for twenty-two years, and he will continue to act as chief executive of the company. After reading law at the Glasgow University and qualifying as a chartered accountant, he made his first contact with the electrical industry in 1927 when he served on the audit of B.I. Cables for five years. In 1932 he joined the staff of the company as its accountant and after holding several senior positions was appointed to the board in 1945. In 1947, at the age of forty-three, he became deputy chairman of B.I.C.C., and in 1950 was also appointed chief executive. One of his major tasks was the merger of the British Insulated and Callender's Cable Companies. He has travelled extensively and his knowledge of overseas trade from his many visits to Canada resulted in his election as chairman of the B.I.C.C. group's new company in Canada, Phillips Electrical Co. (1953), Ltd. He is a member of the Royal Institute of International Affairs.

On his retirement Sir Alexander will be appointed honorary president of the company. In a tribute his co-directors state that the board has decided as a lasting memorial to his services to the company to found a "Sir Alexander Roger Travelling Scholarship" under which one person in the B.I.C.C. group will each year be selected, on the basis of ability and character, to travel overseas for further study, training and general education.

Ashley Accessories, Ltd., have appointed three sales representatives. **Mr. N. Jackson,** formerly with the English Electric Co., Ltd., as a sales and contract engineer will be responsible for North and West Lancashire, with North Wales; he will reside in Liverpool. **Mr. H. Chadwick,** in electrical contracting and wholesale distribution for many years, will cover East Lancashire and Yorkshire, from Manchester, while **Mr. K. L. Irving,** formerly with the North Eastern Electricity Board, and Pope's Electric Lamp Co., Ltd., will represent the company on the north-east coast, residing in Whitley Bay.

Sir George Briggs, A.M.I.Mech.E., has become a director of the Brush Group, Ltd. Sir George is a director of Tube Investments, Ltd., and is a member of the Royal Ordnance Factories board. He was Deputy Controller, Iron and Steel Supplies, at the Ministry of Supply, from 1942 to 1945, and Deputy Controller of Supplies (Munitions Production), Ministry of Supply, from 1951 to 1952.

Mr. R. M. W. Grant, B.Sc.(Eng.), M.I.E.E., M.I.Mech.E., A.M.I.I.A., has been appointed manager of the transformer works of the General Electric Co., Ltd., at Witton in succession to the late Mr. C. H. Nunn. Born in 1905, Mr. Grant graduated in 1928 at Glasgow University. After completing his apprenticeship with Johnson & Phillips, Ltd., he was appointed a designer in their transformer department and became chief designer of the department in 1934. Two years later he joined Marconi's Wireless Telegraph Co., Ltd., as development and design engineer, and subsequently was in charge of the high-power transmitter group. From 1946 to 1948 he undertook development work on servo units for guided missiles as a senior experimental officer of the Ministry of Supply, and in 1948 joined the Brush Electrical Engineering Co., Ltd., as chief designer, Transformer Division. He was appointed their chief engineer and works manager in 1952.

Mr. R. M. W. Grant

Mr. J. E. Parton, B.Sc., Ph.D., A.M.I.Mech.E., M.I.E.E., who, as we briefly reported in our issue of 14th May, is to succeed Prof. H. Cotton on his retirement at the end of this session, as Professor of Electrical Engineering in the University of Nottingham, received his training at Cannock Chase Mining College, the University of Birmingham and the Post Office Engineering Department training school.

Dr. J. E. Parton

From 1931 to 1938 Dr. Parton was part-time lecturer at Cannock Chase Mining College, after which he was for a year part-time lecturer at the Northampton Polytechnic. In 1946 he was appointed lecturer in electrical engineering at the University of Glasgow and in 1949 became lecturer in electrical machinery to final year students.

Dr. Parton's industrial experience has included summer vacations in the Electric Construction Co., Ltd., Wolverhampton, and the Electrical Department, Littleton Collieries, Ltd. (1934-35), and district experience in the Post Office Engineering Department (1938). He has also carried out much research work. During the last war he served in the R.N.V.R., being demobilized with the rank of electrical lieutenant-commander. He is the author of a number of publications and theses on electrical subjects. In addition to the qualifications already given, he is a member of the Institution of Post Office Electrical Engineers, the Institution of Engineers and Shipbuilders in Scotland, and of the American Institution of Radio Engineers.

Lt.-Col. Claud Hardie, D.S.O., has resigned from the boards of Globelite Industries, Ltd., Gillott Electro Appliances, Ltd., and P.A.M., Ltd. His place on the board of Globelite Industries has been taken by **Mr. A. H. Topham,** C.B.E., who is joint managing director of Mawdsley's, Ltd., and **Mr. J. A. Fraser,** general sales manager

of the Southern Areas Electric Corporation, succeeds him on the board of Gillott Electro Appliances. Mr. Fraser is also a director of Ross Courtney & Co., Ltd., and New Day Electrical Accessories, Ltd., subsidiaries in the Southern Areas group of companies.

Mr. F. C. Austin has resigned from the board of P.A.M., Ltd., and **Mr. D. S. Bennett** and **Mr. S. R. Elliott,** A.M.I.P.E., have been appointed directors.

Alderman John Morris, who is on the commercial staff of the Merseyside and North Wales Electricity Board, is the Mayor-elect of Crosby. He has served on the Crosby Council since 1937 and became an alderman in 1947.

A head in bronze by Josephine de Vasconcellos, of **Mr. T. Atherton,** chairman of the Dorman Smith Holdings, Ltd., group of companies, is exhibited in this year's Paris Salon.

Mr. R. W. Wynn has recently joined the Briscott Sales Co., Ltd., as technical sales manager.

To commemorate the jubilee of **Brook Motors, Ltd.,** employees presented a bronze bust of the founder, Mr. Ernest Brook, which was received by his son, Mr. Frank V. Brook, chairman of the company, at a ceremony at the canteen at the head office, Empress Works, Huddersfield. Tribute to the enterprise and energy of Mr. Brook (who was unable to be present for health reasons) was paid by Mr. Harold Frith, manager of the Leeds sales depot and one of the oldest employees, who made the presentation on behalf of the staff and workpeople. Councillor J. L. Brook,

Mr. H. Frith unveils the bust of Mr. Ernest Brook while Mr. Frank V. Brook looks on

director, and brother of the founder, and Mr. John L. Brook, vice-chairman, another son of the founder, were also present. Mr. L. Haslett, assembly department foreman, presided. The following day 4,000 employees and friends from the Huddersfield and Barnsley works travelled in nine special trains to Llandudno as guests of the directors for a day's outing.

Dr. Erwin F. Lowry, manager of the lighting engineering laboratories of Sylvania Electric Products, Inc., has been awarded the 1954 gold medal of the American Illuminating Engineering Society. Dr. Lowry is well known for his work on the development of the fluorescent lamp.

Lord Citrine at Home Farm, Ashcombe. With him are Mr. E. G. Edworthy, Mr. A. W. Allwood, Lady Citrine, The Hon. N. A. Citrine and Mr. and Mrs. S. F. Steward

Miss N. Balls (Newcastle) has been elected chairman of the Electrical Association for Women, and **Mrs. Letitia Bell** (Newport), hon. treasurer.

Mr. John S. Selley, general sales manager, Universal Boilers & Engineering Co., Ltd., and Burnley Aircraft Products, Ltd., has relinquished his appointment on joining the boards of associated companies in the Aluminium Castings Co., Ltd., group. Entering the electrical industry in 1926, Mr. Selley trained with Chamberlain & Hookham and Metro-Vick Supply. He joined Venners in 1931 and remained with them until the outbreak of the last war when he served six years with the R.A.O.C. Upon his release in 1946 he was an assistant director at the War Office with the rank of lieutenant-colonel. For the past two years Mr. Selley has been vice-chairman of the B.E.A.M.A. Domestic Appliance Section.

Many readers will recognize Mr. Selley as the son of Mr. Frank Selley who, until 1948, was chief engineer of St. Marylebone Electricity Department. Mr. and Mrs. Frank Selley have just returned from a visit to Mr. and Mrs. E. E. Sharp in Capetown.

At the annual general meeting of the Institute of Physics held on 18th May, **Sir John Cockcroft** (director of the Atomic Energy Research Establishment at Harwell, and chairman of the Defence Research Policy Committee) was elected president. **Mr. G. R. Noakes** was elected a vice-president, **Dr. S. Whitehead** was re-elected hon. treasurer and **Dr. B. P. Dudding** re-elected hon. secretary. The two new ordinary members of the board elected were **Dr. K. A. G. Mendelssohn** and **Mr. H. P. Rooksby.**

While attending the conference of the Electrical Association for Women on Thursday last week, **Lord Citrine,** chairman of the British Electricity Authority, took the opportunity of visiting Ashcombe, near Dawlish, where the South Western Electricity Board carried out its original experimental Line Rental Scheme which has been one of the main features of its recent successful rural electrification programme. He was accompanied by Lady Citrine, Mr. S. F. Steward, chairman of the South Western Board, Mrs. Steward, and other Board officials. Later he inspected the Board's billing centre at Plymouth.

Mr. W. J. Collins has been appointed Weald district manager of the South Eastern Electricity Board. He has been deputy district manager of that district and succeeds **Mr. W. B. Abram,** who retires on 28th May.

Mr. Howard Long, M.I.E.E., F.I.E.S., who is now manager, technical sales development, with Benjamin Electric, Ltd., has moved from Solihull to 58, Georges Wood Road, Brookmans Park, Hatfield, Herts (telephone: Potters Bar 3701).

Mr. R. P. Mason, commercial manager, and **Mr. C. L. Chapman,** chief development engineer, of Venner Accumulators, Ltd., are leaving on 26th June for a fortnight's business trip to Norway and Sweden.

A sports day was held jointly on 14th May by the **British Driver-Harris Co., Ltd.,** and **Ripaults, Ltd.** The sports day is held each year, the venue alternating between Manchester and Enfield. The British Driver-Harris Co. were the hosts this year.

Terence Rattigan's comedy "While the Sun Shines" was presented by the **Johnson & Phillips' Amateur Dramatic Society** on 13th, 14th and 15th May at the Social Club Hall at Charlton. This was the fifteenth play this group had staged.

The **Electrical Industries Benevolent Association** London area golf meeting will be held on Thursday, 1st July, at the Berkshire Golf Club, Ascot. Anyone who would like to play can obtain cards to qualify for the meeting

from Mr. L. H. Welch, 60, St. Martin's Lane, W.C.2. The best 75 completed cards received by 14th June will qualify to play. A foursome competition will be held in the afternoon.

A steady increase in membership (from 117 to 132) was reported at the recent annual general meeting of the **Ipswich and District Electrical Association** at Electric House, Ipswich. The retiring chairman, Mr. G. H. Blackburn, in investing Mr. H. E. Wright (Thirkettle & Wright) with the chairman's badge of office, said it was very appropriate that Mr. Wright should be chairman of the Association in the year it reached its majority as he was one of the original members of the Association. Mr. S. Hardy (B.X. Plastics) was appointed vice-chairman. Mr. C. T. Melling was re-elected president.

OBITUARY

Mr. S. H. Harper-Bill.—The death occurred on 17th May, at the age of seventy, of Mr. Sydney Harold Harper-Bill, who was for many years managing director of General Accessories, Ltd., Bristol, and a director of British Mechanical Productions, Ltd. Both these companies were acquired by the Edison Swan Electric Co., Ltd., at the end of 1951. Since then he had acted in a commercial advisory capacity till his retirement in 1952 but he continued his consulting practice.

Mr. Harper-Bill had spent fifty years in the electrical industry. He was a member of the Institute of Export and chairman of the Bristol and District branch; a member of Bristol Engineering Manufacturers' Association; member of Bristol Chamber of Commerce; a Freeman and Liveryman of the City of London.

Mr. K. J. Noble.—The death occurred on 10th May of Mr. Kenneth John Noble who, until his retirement owing to ill health in 1947, was director and secretary of the International Electrical Association, and was formerly representative of the Export Department in London of the British Thomson-Houston Co., Ltd. Mr. Noble was engaged in export work during the whole of his career. He joined a number of British engineers in the A.E.G. Foreign Department in Berlin, under Mr. R. T. Durran, in 1913, and on the outbreak of the 1914-18 war returned to this country, joining the B.T.H. Co., in the Export Department at Rugby. For some time after the war Mr. Noble was engaged on export turbine sales, and later he took charge of the first South African railway contract.

At the end of the 1920's Mr. Noble assisted Mr. W. C. Lusk in the formation of the world-wide association of concerns manufacturing electrical and allied plant, for which the name International Electrical Association was ultimately chosen.

Electricity in South Africa

A South African patent has been taken out for a new electric kettle which will automatically switch off when it has been left boiling for 30 seconds.

If a survey to be carried out on Marion Island is successful, a hydro-electric plant is to be built to replace the diesel-engined power unit which has been in use since the island was first occupied in 1948. The site selected for the plant is about two miles from the present settlement. An alternative scheme of wind chargers and diesel motors combined is also to be investigated.

On 5th March the first electric train travelled over the 20 miles of recently electrified track from Worcester to De Doorns. The first test run between De Doorns and over the Hex River Pass to Touws River is expected to take place by the end of June. A daily electric run between Worcester and De Doorns has now been started.

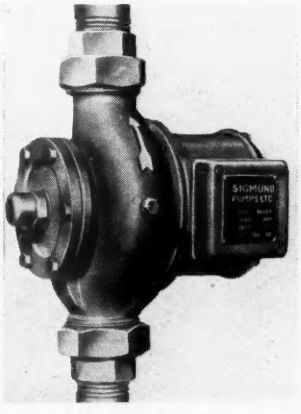
A quotation of £43,771 by Clyde Blowers, Ltd., the lowest of four tenders for soot-blowing equipment at Table Bay power station, has been accepted by the Cape Town City Council.

Power cuts can be expected in Cape Town during the coming winter. The city electrical engineer says that load-shedding will be unavoidable in spite of aid from the Hex River power station. Because of delays, the new Salt River power station boilers will not be ready in time. The half-hour maximum demand for 1954 is estimated at 290,000 kW, while the total capacity of plant available to meet it is 250,000 kW, including 20,000 kW from Hex River. This means that load-shedding will probably start in May and reach a maximum in July and August.

The first of the eight 120 ton stators for the Wilge power station of the Electricity Supply Commission near Witbank has been delivered from C. A. Parsons & Co., Ltd., and is at present being stored at the Taaibos power station. The 60,000 kW turbo-alternators for this new station are the largest generating units ever to be installed in South Africa.

Hot Water Circulator

Sigmund Pumps, Ltd., Gateshead, have recently introduced the "Thermopak," a compact motor driven pump specially designed for use as an accelerator in any form of hot water central heating system. The development is based on the conceptions that the many practical advantages afforded by forced circulation are such that it is rapidly replacing the thermo-syphon system in industrial and domestic hot water systems; that the efficiency and reliability of any central heating installation operated by forced circulation depends primarily on the accelerator; and that only a unit designed and constructed specifically for this duty can satisfactorily fulfil the operating requirements of modern heating practice in the application of forced circulation in a central heating installation.



Sigmund "Thermopak" hot water accelerator

Judging from a demonstration unit which we saw in operation connected in a simple pipe circuit it runs extremely quietly. It is a glandless device and the motor and impeller have a common shaft. The unit is a compact, light, streamlined equipment of precision construction designed to give a high output and to offer little resistance to the passage of the water when the accelerator is not running.

The entire rotating element is separated completely from the stator windings by a shell of non-magnetic metal. The very widely dimensioned stainless steel and bronze bearings are lubricated by the circulating water drawn from the circuit along the accelerator shaft. The glandless design ensures water-tightness.

Advertisement Withdrawn

We are asked by the South East Scotland Electricity Board (Edinburgh Sub-Area), to say that the Board's advertisement in our issue of 21st May (page 132) for a second assistant district engineer, a third assistant engineer and junior engineers, has been withdrawn.

PARLIAMENTARY REPORT

IN the House of Commons last week Mr. Nabarro asked the Secretary of State for Scotland what was the anticipated load factor of the hydro-electric works embodied in the Orrin project, installed capacity 18 MW, referred to in the North of Scotland Hydro-Electric Board (Constructional Scheme No. 29) Confirmation Order, 1954; and what was the anticipated coal economy equivalent based on that load factor and a conversion rate of 1·31 lb of coal per kWh generated, generally in accord with the average efficiency of British Electricity Authority power stations.

Mr. Henderson Stewart said that the Secretary of State was informed by the Board that the expected load factor of hydro-electric works embodied in the Orrin project was approximately 48 per cent and that the expected saving in coal at a conversion figure of 1·31 lb of coal per kWh generated was about 45,000 tons annually.

In reply to a further question Mr. Henderson Stewart said that the capital cost per MW to be installed in the Orrin project, based on the estimates submitted to Parliament, was about £252,000. The Secretary of State was informed by the Board that if the cost of transmitting the power to the Board's grid was added this figure would be increased to about £258,000.

The Board hoped to start preliminary works in connection with the scheme this year and the main works next year, and to produce electricity from it by 1960. The scheme had been approved by the B.E.A.

Diesel Vehicles or Trolley-buses

Mr. Palmer asked the Minister of Transport what reduction was brought about in total passenger carrying capacity by the decision to substitute diesel oil vehicles for electric trolley-buses in London.

Mr. Lennox-Boyd said he was informed that the passenger carrying capacity of the new vehicles would be similar whether they were powered by oil or by electricity.

Mr. Palmer said that because the trolley-bus carried 70 passengers and the diesel bus only 64 passengers 200 extra vehicles would be required to give the same passenger-carrying capacity. It was obvious that the London public would have a reduced service. Would the Minister take action to restrain the London Transport executive in exercising their bias against this useful electric vehicle?

Mr. Lennox-Boyd said that this might be so if Mr. Palmer's expectation were correct. The new vehicles would, however, have about the same seating capacity so that made the answer he had given perfectly correct. There would be considerable economy from the substitution of diesel for trolley-buses and that was the overriding consideration.

Mr. Ernest Davies asked if it were not true that the new buses could be loaded and unloaded quicker than the trolley-buses owing to their design. Mr. Lennox-Boyd said it was true and it should lead to a speeding up and a smoother flow of London traffic.

Colour T.V.

Mr. Woodburn asked the Assistant Postmaster General if he would make a statement about the progress of British research on colour television; and if he would give an assurance that steps were being taken to see that no restrictions of false economy would handicap British science taking its proper place in speedy advance.

Mr. Gammans said that the British radio industry was doing a great deal of research into colour television and the B.B.C. was co-operating closely. The Postmaster General had asked the Television Advisory Committee to investigate the question of introducing a colour system in this country. This was bound to take some considerable time because there were several difficult technical and other problems to be solved before a reliable and economic colour service could be provided for the public.

A Question of Title

Mr. Palmer asked the Minister of Fuel and Power what estimate he had made of the total expenditure likely to be incurred by the British Electricity Authority as a result of the proposed change of its title to Central Electricity Authority.

Mr. Joynson-Hicks, the Parliamentary Secretary, said he did not expect this change to involve the Authority in any substantial expenditure.

Mr. Palmer asked if the taking away of this robust title of British Electricity Authority, which, when the Scottish Bill became an Act would still embrace the whole of England and Wales, was not frivolous in the extreme. Would the Government reconsider the matter?

Mr. Joynson-Hicks said he did not think Scotland would consider it frivolous.

Fuel and Power Policy

Mr. Palmer asked the Minister of Fuel and Power if he would make a statement on the arrangements he had made for co-ordination in the national interest of the broad policy of the fuel and power industries.

Mr. Joynson-Hicks said that the Minister approved the investment and research programmes of each nationalized industry and for more general purposes he had the help of a Co-ordinating Committee which consisted of the heads of the three industries concerned.

Mr. Palmer asked if these arrangements carried out fully the intention of the Ridley report.

Mr. Joynson-Hicks said that they did.

Mr. Noel-Baker asked whether, having regard to the Ridley report, the Government considered that they had taken the action required to promote a national fuel policy.

Mr. Joynson-Hicks replied in the affirmative.

Midlands Bulk Supply Charges

Dissatisfaction was expressed at a meeting of the Midlands Electricity Consultative Council at Gloucester on 17th May that the Council, as the consumers' representative, had no say in the fixing of bulk supply charges. The chairman, Mr. R. M. Barrow, said that as these charges represented 70 per cent of the price consumers paid for their electricity, it was only right that the Council should be consulted in price increases. A resolution was passed stating that in the view of the Council the legislation should be altered and that the review of the matter hinted at by the Minister should take place in the near future as one of urgency. The reference was to a letter received from the Minister of Fuel and Power which stated that it would require legislation to provide a more effective means of enabling the Central Authority to be made aware of the views of Consultative Councils. It was stated that the Council had power to make representations to the Midlands Electricity Board but not to the British Electricity Authority. The Minister agreed that this was a matter that required change but until the whole statutory position had been reviewed it was not possible to make any change.

At the same meeting the Council discussed the lack of electricity in the rural areas of North East Staffordshire and considered a letter from the M.E.B. which stated that the area was a difficult one as the farms were small and scattered. It was proposed to spend £32,000 in the district in the next two years, the Board said. It was decided to ask the committee concerned to go through the programme for the electrification of the area and report to the Council.

INDUSTRY AND THE HOUSE

Electricity Reorganization (Scotland) Bill

By A. M. F. PALMER, A.M.I.E.E., M.P.

WHILE of considerable interest to the electricity supply industry, the Committee Stage of the Electricity Reorganization (Scotland) Bill hardly raised a flicker of interest in the great world outside, as represented by the lay press. Maybe it was because the discussion started in the middle of a Wednesday evening following much long and heavy talk on the Town and Country Planning Bill as applied to Scotland. Apart from two or three English Members having a special interest in electricity the Commons' benches were populated throughout with Scottish representatives only, these spread thinly.

B.E.A. to C.E.A.

A startling moment was when at half an hour before midnight Commander Donaldson, a Scottish Conservative back bencher, moved an amendment seeking to change the name of the British Electricity Authority to "Central Electricity Authority." With respect to the Commander it was accurate to say that he had played no very prominent part previously in our discussions and this, plus the eight-word speech with which Mr. Joynson-Hicks, Parliamentary Secretary to the Ministry of Fuel and Power, accepted the change, combined to give an impression to the knowing parliamentarian that the amendment was perhaps "arranged."

The justification for a curt wiping out of the robust title of the world's greatest single electricity authority and the substitution for it of an "anonymous, bureaucratic" appellation (to quote Mr. Hector McNeill, a former Secretary of State for Scotland), in a Schedule to an auxiliary Bill, is hard to find. The only clue given by Commander Donaldson was his remark: "While none of us in the Scottish section of the Committee wish to pass any reflection on Welsh Members, we are proud of our Scottish way of thinking." Knowing the past reputation of the Scots for intellectual prowess, it is not easy to believe that nowadays they are so easily pleased.

There were no divisions throughout the Committee Stage, reflecting in a minor degree the still mixed feelings of some Scottish Opposition Members about the Bill's merits. This was brought out in the comments of Mr. Arthur Woodburn during the discussion on Clause 2. Mr. Woodburn stated: "At present there are four organizations in South Scotland and there is bound to be an economy by merging them into one. . . . So far as opinion in Scotland is concerned we feel we can accomplish both economies and improved efficiency by fusing them." Very understandably the Under-Secretary, Mr. Henderson Stewart, expressed himself as obliged to Mr. Woodburn for the support given to the principle of the Bill, in contrast, presumably, to critics such as the writer who argue that the arbitrary and artificial division of United Kingdom thermal generation and bulk transmission at the Border is cumbersome and unnecessary.

However, when the Committee reached in due course Clause 4 which is unique in the sense that it proposes to establish by statute a detailed form of organization for the affairs of the new Board, previous optimism about opportunities to experiment in the combination of generation and distribution were confounded. Clause 4 compels the South of Scotland Board to establish schemes for an East Executive and a West Executive and to submit these to the Minister for approval. Labour Members pointed out that the obvious course was to leave the form of organization and the working of it to the responsible men and women to be appointed in due course to the Board; let them adapt and modify their arrangements as advised by their experts in the light of experience. As things stood there might be a tendency for administration to be done in future through the Secretary of State's office and not direct by the Board. Liberal support for criticism of the clause was forthcoming from Mr. Grimond, speaking for Britain's most northerly constituency, Orkney and Shetland. He said it had been argued by the Government that one of the advantages of the measure was that it would allow experiments to be made. The Government had now contradicted themselves by not leaving the Board free to think out the right experiments and make them. He went on to say that under this clause Southern Scotland would probably have the same organizations running under new names, with no advantage in greater efficiency or lower costs.

To all this barrage of criticism Ministers provided only the shortest answers; it seems certain that the issue will be raised again at the Report Stage.

The Committee discussions ended just before midnight in an atmosphere of general harmony when the Secretary of State accepted an amendment sponsored by the unions and staff associations in the industry to retain the *status quo* in the matter of machinery for collective bargaining. In effect, it compels the three proposed authorities, i.e. the present B.E.A., the North of Scotland Hydro-Electric Board and the new South of Scotland Board to act jointly and collectively when recognizing trade unions for negotiating purposes and when either setting up or changing arrangements for salary and wage negotiations.

Membership of South of Scotland Board

Among other points raised during the Committee discussion was a demand for a specific requirement that one member of the new South of Scotland Board should have had experience in the "organization of workers" as provided in the Electricity Act, 1947, and in all the other nationalization Acts. This was resisted by Mr. Henderson Stewart on the grounds that there was no precedent for it in the 1943 North of Scotland Act; so far as possible the Government was anxious to keep the pattern of the two Scottish Boards the same. If there was no special provision for an expert in labour relations, equally was there no special provision for experts in commerce, technology or finance. The Committee could be assured that the Government would appoint the best people available and certainly trade union claims would be considered.

A change brought about by the Bill is in that section of the Local Government Act, 1948, which deals with payments by supply authorities in lieu of rates. If the Bill becomes law these will now be calculated on a formula which will take into account sales of units generated outside

the area of the Authority concerned. This should rectify any tendency which the old system might have had in working unfairly to England under the new circumstances.

Parliamentary questioning has attempted to probe, without much success, into the decision of the London Transport Executive to replace the existing London electric trolley-bus fleet by diesel-powered vehicles. Mr. Nabarro asked the Minister of Fuel and Power what estimate he had formed of the additional oil fuel consumption entailed in a full year and the effect upon the load factor of power stations in the Greater London area following the loss of the road traction demand. Mr. Langford-Holt wanted to know what increase in the number of public transport vehicles would result from the decision and what steps the Minister was taking to see that no increase of traffic congestion resulted. Supplementary questions have made the points that diesel buses are dirtier than electric trolley-buses and that they are less economical to run.

In spite of all this the London Transport Executive are apparently determined to make the change which seems a pity in view of reports that in other parts of the world the trolley-bus is still in the ascendent as a solution to the passenger traffic difficulties of large cities.

NEW BOOKS

Data and Circuits of Television Receiver Valves. By J. Jager. Pp. 216; figs. and index. Philips Technical Library. Cleaver-Hume Press, Ltd. Price 21s.

This is really a valve applications handbook dealing with the Philips " World Range " of television valves in relation to receiver design. Within those sections of industry in contact with the makers of these valves much of the information will not, of course, be new, but apart from this Mr. Jager's book will be of some interest.

It is unfortunate that there is no reference to the particular problems of the British television system. Amplitude modulated sound and positive modulation of the vision carrier have resulted in certain techniques and while the reader may be interested in the European system one feels that the value of the book to, say, a service engineer will be somewhat limited.

This is, however, the essentially practical book of the series and from this viewpoint is worthy of some praise. The circuit applications given with the full data for each valve type in the series are well described and complete. The second part of the book deals with particular circuits followed by a description of a complete receiver design along modern lines. With the above reservation concerning systems this volume is recommended in particular to those with some knowledge of basic principles who wish to take an interest in television receivers.—D.H.F.

Cathode-Ray Tubes. Edited by M. G. Say. Pp. 216; figs. and index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 25s.

This book devotes about a third of its length to the theory and construction of the tubes themselves, the remainder consisting of chapters on television tubes and control circuits, radar tubes, instrument tubes, camera tubes, oscilloscope technique and special tubes including switch and storage tubes.

The general section, by Mr. L. S. Allard, is the best brief account of electron optics applied to modern c.r. tubes known to me, and should be read by all tube engineers. Mr. Emlyn Jones on T.V. tubes is interesting and to the point. The extensive tabulations of available c.r.t. characteristics in this and other chapters are very welcome. The chapters on instrument tubes and techniques by Messrs. Grodszinsky and Cass and by Mr. J. H. Reyner, respectively, are useful but naturally consist mostly of standard material. Mr. Jennings deals with the more recently introduced camera tubes, C.P.S. Emitron, Image Orthicon and midget Super Emitron, in a lucid manner. The last chapter, presumably again by Mr. Allard, deals with the electron beam commutators developed by the G.E.C., storage tubes and the Philips ribbon beam switch tubes. The chapter on radar tubes is below the standard of the rest of the book. Each chapter has a useful bibliography. The book is well printed on good paper and it should find a place on many bookshelves.—A.H.B.

Information Theory. By Stanford Goldman. Pp. 385; figs. and index. Constable & Co., Ltd., 10, Orange Street, London, W.C.2. Price 50s.

This is the latest work of this author, who is already well known for his previous books " Transformation Calculus and Electric Transients " and " Frequency Analysis, Modulations and Noise." Although not essential, this latter book forms a good background and standard for the understanding of this present work and is quoted extensively.

The first chapter deals with discrete systems, this being simpler than dealing with continuous signals for explaining to the uninitiated the implications of the theory of information and introducing the terminology. Here and throughout the book, the author has taken great care to give good and lucid definitions for these various terms. The mathematical definition of " Information " is simpler than that given by Shannon in terms of entropy. The author does not, however, favour the almost universal contraction " bit " for binary digit, preferring a binit to a bit of information.

The second chapter develops some properties of continuous signals which are used in the next four chapters where the basic information theory of discrete systems is extended to deal with continuous signals and introduces ergodic ensembles and random noise, entropy and use of time-frequency signal space. Chapter 7 deals with modulation and the problem of noise reduction. Chapter 8, although a good discourse on linear filtering and prediction, seems a little out of place. The last chapter is a non-mathematical survey or summary of the information theory developed in the text, and is an extremely valuable addition.

The book is essentially mathematical with an electrical communication theory bias, but is written and presented so that lack of mathematical knowledge on the part of the reader should not be a deterrent.—J.C.W.

BOOK RECEIVED

Introduction to Electric Fields. By Walter E. Rogers. Pp. 333; figs. and index. McGraw-Hill Publishing Co., Ltd., 95, Farringdon Street, London, E.C.4. Price 60s.

Electrical Trades Union Policy

Topics at the Opening Sessions of the Union's Annual Conference

THE eighth annual delegate conference of the Electrical Trades Union opened in the floral setting of the Winter Gardens at Margate on Monday when the principal events were the presidential address by Mr. Frank Foulkes and a review of the recent dispute in the electrical contracting industry. The delegates, who numbered some 350 and included visitors from Norway, Poland and Czechoslovakia, were given a civic welcome by the Mayor (Ald. H. V. Ward, J.P.), following which the general president delivered his address.

Referring to the growing strength of the Union, Mr. Foulkes said that individual members were being enrolled at the average rate of 1,600 a month and the total membership now stood at over 220,000. During the past year they had proved that the Union, in which there was no discrimination against individuals for their political or religious beliefs, or their race or colour, could mould itself into a fighting force without fear of defeat. He mentioned particularly the demonstration of loyalty of the Union's contracting industry members in carrying out a very difficult " strategic fight " against their employers and the support given to them by other members and other unions.

The first resolutions on the agenda were concerned with domestic matters of the Union. One related to extension of the convalescent facilities, on which the general secretary (Mr. W. C. Stevens) announced that plans were in hand for enlarging the Union's home at Rustington. Calls for the inauguration of voluntary sick pay and pensions schemes and the formation of a building society were rejected, the assistant secretary (Mr. F. Haxell) declaring that it was impossible to provide these facilities, in addition to present commitments, out of the existing subscription of 1s 3d a week. A resolution recording appreciation of the Union's residential training college opened at Esher last year was carried unanimously, the general secretary stating that so far over a thousand members have taken part in the 32 courses held there.

Turning to the training of apprentices, the conference carried a resolution urging the Executive Council to ensure that all apprentices in the contracting industry, irrespective of category, should receive one day's technical training a week up to the age of 21. Mr. R. G. McLennan said that the Executive had already taken steps to secure such training for apprentices up to the age of 18, but they were still not satisfied that all apprentices in categories 1 and 2 received the full day's training. It was only recently that, as a result of arbitration, a decision in favour of compulsory day release of apprentices had been obtained in Scotland.

Mr. A. Fisher (Brixton) drew attention to the position of apprentices in the service of firms engaged in specialized work and suggested that they should be given the opportunity of changing their employers from time to time to acquire full practical knowledge of the industry. Mr. L. J. Gregory assured the conference that the Executive supported the principle of apprentices being given all-round training, but said there were difficulties in trying to implement the resolution in the way desired. The best approach was through the Apprenticeship Council.

On the subject of apprentices' wages it was announced that at a special meeting of the National Joint Industrial Council for the Electrical Contracting Industry on 14th May, agreement was reached on the Union's claim for an increase in the percentage rates paid. This matter had been before the N.J.I.C. for some eighteen months, the N.F.E.A. contending that because of the Union principle that apprentices should not carry out any actual work until the last year of their apprenticeship they were unprofitably employed from the point of view of productivity whereas in the building and engineering industries apprentices were allowed to undertake work from the earliest days of their apprenticeship. The new rates, which come into operation as from 14th June, and represent increases ranging from 1½d to 5½d an hour, are as follows:—

Revised Rates for Apprentices

Age	Percentage	Grade A	Grade B	Mersey District
		s. d.	s. d.	s. d.
15	20	0 10	0 9	0 9½
16	25	1 0½	0 11½	0 11½
17	30	1 3½	1 1½	1 2
18	45	1 10½	1 8½	1 9
19	55	2 3½	2 1	2 1½
20	70	2 11½	2 7½	2 8½

A report on the recent dispute in the electrical contracting industry was presented by the general secretary, who characterized it as one of the most important in the history of the trade union movement. A resolution congratulating the Executive on its leadership throughout the dispute was carried unanimously.

Among other matters which were to be discussed during the course of the conference were wage differentials between skilled and unskilled workers, the frequently discussed subject of a national rate for the contracting industry, and the compulsory enforcement of the I.E.E. regulations. A section of the report of the Executive Council reviewed the discussions that have taken place with a view to the introduction of an inspection scheme for electrical installations, with statutory control. A resolution on the nationalized electricity supply industry sought to obtain conference support for the return of the Electricity Boards to municipal ownership " owing to the failure of the Boards to offer to the public a service which is an improvement on that given when under municipal control, or even maintain pre-vesting standards and a similar failure in relation to the working conditions of their employees."

Still discussing the conditions of contracting employees, the Conference supported a request that the Executive Council should seek to bring the method of determining, and qualifications for, subsistence allowances up to standard. The Conference also asked that the N.F.E.A. should be pressed to amend the statutory holidays agreement to give all districts six days a year, and provision for transferring to a working day any holiday that fell on Saturday or Sunday.

The delegates reiterated their action that the E.T.U. should have sole negotiating rights for workers employed in the contracting departments of Electricity Boards.

Although, following recent awards, there was an absence of definite claims for wage increases, when the general subject of wages, prices and profits was discussed on Tuesday, the secretary made it clear that these awards did not mean the end of wage claims for a considerable time to come, declaring that the Union would use all its resources to fight to improve the standard of living of its members. He contended that had the basis of calculation that led to the increase in M.P.s' salaries been applied to the wages of contracting electricians they would have received an increase of 4d an hour instead of 2½d.

After listening to a number of speeches critical of arbitration, the delegates were told by a visitor from the T.U.C., Mr. H. Douglas, general secretary of the Iron and Steel Trades Confederation, that this country could not afford the luxury of strikes.

During the week preliminary discussions were held with a view to convening an international conference of electrical workers.

INDUSTRIAL NEWS

Electricians' Strike

LAST WEEK-END 50 of the 180 electricians involved in a strike at the Greenford and Cadby Hall establishments of J. Lyons & Co., Ltd., the caterers, sent a telegram to the president of the Electrical Trades Union complaining of "unprincipled exploitation" by the Union. The men protested that they had been forced to strike in support of a principle with which they had no sympathy.

The strike was called because of the company's refusal to require an electrical supervisor to remain a member of the Union.

At the E.T.U. Conference at Margate on Monday Mr. F. Foulkes (general president) said that unless there was an immediate settlement, the strike might be extended to the company's other establishments. In response to the telegram it was decided to send a member of the Union executive committee to address the strikers, informing them that they were free to return to work if they wished but that if they decided to continue the strike they would have the Union's full support.

Contract Price Formulæ

The British Electrical and Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 15th May is deemed to be 150s 6d. The "cost of material" figures are:—

For electrical machinery and equipment the Board of Trade index figure published on 15th May is 156·7.

For turbo-generating and allied plant: materials used in mechanical engineering industries, 147·5 (provisional), blast furnaces and iron and steel smelting and rolling (40 and 41), 143·4, price of ⅝in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 14th May), 3s 6⅞d per lb. Outstanding contracts covered by the B.O.T. intermediate products index: the index figure for intermediate products (15th May) is 356·0.

Canadian-Approved Apparatus

The B.S.I./C.S.A. Approvals Agency, British Standards House, 2, Park Street, London, W.1, has produced in booklet form a list of United Kingdom electrically-operated equipment which has been approved by the Agency as conforming to Canadian requirements, up to 31st March last. Copies of the booklet, which lists a wide variety of electrical equipment under the names of the manufacturers, are obtainable at 3s 6d each from the British Standards Institution at the above address. At the end is a summary of Canadian representatives and their United Kingdom manufacturers.

Edinburgh Ideal Home Exhibition

Among attractions of the Ideal Home Exhibition held recently in Edinburgh's Waverley Market were demonstrations given by the South East Scotland Electricity Board of washing machines, vacuum cleaners and cookers. A wide range of domestic appliances was displayed, the automatic cookers creating considerable interest. New refrigerators also drew much attention.

Laxton's Builders' Price Book

The 127th edition of Laxton's Builders' Price Book is now available (edited by P. T. Walters, F.R.I.C.S., and published by Kelly's Directories, Ltd., 186, Strand, London, W.C.2, price 30s). All the prices have been revised and incorporate the increased wages operative from 24th May, and much additional information has been incorporated. An important part of the book containing 272 pages is the list of brands and trade names containing over 11,000 items, together with a separate alphabetical list of names and addresses, etc., of firms connected therewith.

Durham Bursary

The Junior Institution of Engineers offers for annual competition the Durham Bursary of the value of £20 in cash. The award carries with it membership of the Institution for three years. Further particulars may be obtained from the Secretary of the Institution, 39, Victoria Street, Westminster, London, S.W.1.

A.S.E.E. Change of Address

The offices of the Association of Supervising Electrical Engineers and the Electrical Engineers' (A.S.E.E.) Exhibition, Ltd., have been moved to 23, Bloomsbury Square, London, W.C. The telephone numbers are:—A.S.E.E., Langham 5927–8–9; Electrical Engineers' Exhibition, Museum 3450 and Langham 5929.

Electricity at the Wildfowl Trust

A 7½ h.p. electric motor capable of pumping 20,000 gal of water per hour will shortly be in operation at the premises of the Wildfowl Trust (until recently known as the Severn Wildfowl Trust) at Slimbridge, Gloucestershire, to keep fresh water flowing during the summer through the streams and pools which accommodate the world's largest collection of swans, ducks and geese. The installation has followed the provision last December of a mains supply of electricity to Slimbridge, in the course of the Midlands Electricity Board's rural development programme.

Underground l.v. mains have been laid to some of the premises, including the home of Mr. Peter Scott, the founder and honorary director of the Trust, and later it is intended to carry h.v. lines underground to the extreme ends of the reserve, so that there will be ample capacity for future use of electricity for water pumping, heating of brooders and other purposes.

In the meantime a 3,000 gal/hour pump is increasing the flow in some of the water channels, and electricity has been connected to a group of brooders, to help to provide a constant temperature for the hens whose job it is to hatch some of the rarer birds bred by the Trust. An electrically heated incubator has also been brought into use and there is a refrigerator for preserving dead birds pending post mortem examination.

Factory Effluents

A handbook published by the Federation of British Industries under the title of "Disposal of Waste Waters from Industrial Premises" brings together for the first time in one publication all the complicated legal provisions affecting the disposal of trade effluent. The handbook gives an idea of the magnitude of the problem which industry has to face in carrying on its job with the minimum of damage to fisheries and public amenity, and of the amount of research which is now being done on the technical aspects of the problem. Copies are obtainable from the F.B.I., 21, Tothill Street, London, S.W.1, price 2s 6d.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £240 10s 0d
Fire Refined 99·70%	ton £239 0s 0d
Fire Refined 99·50%	ton £238 0s 0d
COPPER Tubes ..	lb 2s 3⅞d
Sheet	ton £299 15s 0d
H.C. wire and strip ..	ton £270 10s 0d
LEAD, English ..	ton £94 10s 0d
Foreign	ton £93 0s 0d
MERCURY	flask £90 0s 0d
TIN, block (English) ..	ton £722 0s 0d
ZINC, G.O.B. Foreign	ton £85 0s 0d
Electrolytic	ton £86 15s 0d
BRASS Tubes (solid drawn)	lb 1s 10⅝d
Sheet	ton £245 10s 0d
Wire	lb 2s 6½d
PHOSPHOR BRONZE Wire	lb 3s 9⅛d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 18⅝d–18⅞d

Pottery Kiln Exhibition

With the co-operation of the South Eastern Sub-Area of the London Electricity Board, the Applied Heat Co., Ltd., staged an exhibition of "Grafton" pottery kilns in the showroom at Electricity House, Erith, from 15th to 18th May. The day before the exhibition opened, Mr. W. H. Chapman, chief designer of the company, lectured to two parties of students in the adjoining lecture hall on pottery and kilns. The exhibits were primarily of interest to studio potters, and included a selection of fine ware, lent for the occasion by the pottery section of the Woolwich Polytechnic, which has been using "Grafton" kilns for some years. Large equipments, etc., were illustrated by means of photographic enlargements.

Hospital Telephone Exchange

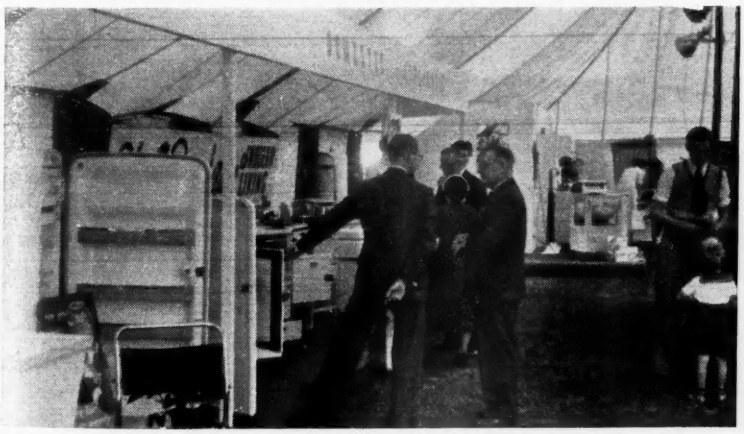
A new automatic telephone exchange has been installed at Withington Hospital, Manchester, by Communication Systems, Ltd. The exchange provides for twelve exchange lines and 200 extensions throughout the hospital, and replaces previous services consisting of two switchboards at separate sites and a private internal installation with 137 extensions. The installation, which cost £7,500, combines a standard G.P.O. switchboard and a separate internal communication system. Instead of having two telephones, one for making and receiving calls on the public network and one for internal communications, a single telephone now serves both purposes.

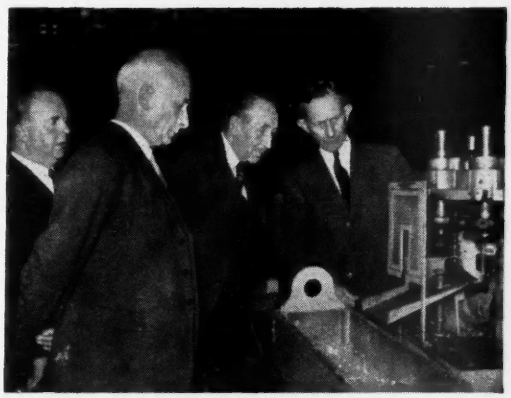
Oxfordshire Agricultural Show

The first of the County Shows was held on 12th and 13th May at Oxford Airport and attracted 20,000 visitors. Amongst the many trade exhibits that of the Southern Electricity Board was one of the chief attractions. As in previous years, the Board set out to show some of the many ways in which electricity is helping the lot of the farmer, his wife and employees. The domestic section of the display was popular, a central feature being a compact kitchen unit. Cooking and washing demonstrations were given during the Show. Equipment of particular interest to the farmer included examples of the latest type of dairy sterilizing and water heating equipment. There were also representative exhibits of machinery used for grain drying, conveying and elevating. Poultry troughs fitted with electric heaters to maintain a constant minimum water temperature were shown, together with time switches for providing extended hours of lighting. There were several interesting scale models depicting how electrical equipment is used in a dairy, in a piggery and in the barn. Automatic electric pumps, food cookers for dealing with potatoes to feed pigs and poultry and an automatic grinding mill were also shown.

The horticultural section was staged in conjunction with the Oxfordshire National Agricultural Advisory Service and National Farmers' Union, the main theme being electricity for propagation.

The display of domestic equipment in the marquee of the Southern Electricity Board at the Oxford Agricultural Society's Show





In the "Mazda" lamp works, Rugby, showing (left to right): Mr. W. W. Vinsen (director of manufacture, B.T.H.), Mr. E. H. Ball (managing director), Viscount Brookeborough, and Mr. S. R. Eade (manager, lamp factories)

Ulster Premier at B.T.H. Works

On 18th May, Viscount Brookeborough, the Prime Minister of Northern Ireland, accompanied by Lord Glentoran, Minister of Commerce, and Mr. W. N. McWilliam, Assistant Secretary to the Cabinet, visited the main works at Rugby of the British Thomson-Houston Co., Ltd. The party was welcomed by Mr. E. H. Ball (managing director), Mr. W. W. Vinsen (director of manufacture), Mr. H. L. Satchell (director, manager Rugby Works), and other executives of the company, who afterwards accompanied the visitors on a tour of the works. The itinerary included visits to the turbine factory, heavy plant factory, fabrication department, control gear factory, industrial electronics factory, lamp works, and research laboratory. The visit to the turbine factory was of particular interest in view of the B.T.H. programme now in hand for the expansion of its turbine business which involves the erection of a new factory in Larne, Northern Ireland. This new factory will concentrate on the manufacture of large turbo-alternators, of 30,000 kW and upwards, and will be built alongside the turbine blading factory already under construction by the Northern Ireland Government.

Coal Mines (Mechanics and Electricians) Regulations

The Coal Mines (Mechanics and Electricians) General Regulations, 1954 (Statutory Instrument No. 594), is now available from H.M. Stationery Office, price 4d net.

Coal Preparation Plant Order

The Fraser & Chalmers Engineering Works of the General Electric Co., Ltd., has received an order for the supply of a complete coal preparation plant for the National Coal Board, South Western Division, to be installed at the Board's Maesteg site in South Wales. Operating as a central washery, it will serve four pits. The plant will include a 12ft diameter Chance cone for three-product separation. Input to the washery will be 250 tons per hour of raw coal, the cone having a capacity of 120 tons per hour of 8in by 1½in coal. Included in the contract are a steel framed building to house the plant, conveyors, shaker screens, crushers, all electrical control gear, civil engineering

work, lighting, power wiring and heating.

Electronics and Radio Careers

A booklet on " Careers in Radio and Electronics " has been produced by the Radio Industry Council (59, Russell Square, London, W.C.1) and it is being circulated by the Ministry of Labour to grammar and technical schools and youth employment offices throughout the country as well as directly to public schools. The immense scope of employment offered by the industry, in both the technician and engineer grades, is stressed, as well as the opportunity afforded by the armed forces and Government services. Illustrated notes give a good general idea of the electronics industry and its structure and an indication is given of the type of young people required. Attention is drawn to the training schemes operated by many firms and further guidance is offered by the Ministry and the Council.

Transport Costs

The " *Motor Transport* Cost Tables " (published for *Motor Transport* by Iliffe & Sons, Ltd., price 1s, postage 2d) give the latest costs of running all types of goods vehicles, including the vehicle levy that came into force on 1st January. Variations in road haulage drivers' wages and the cost of petrol and diesel fuel have been taken into account. The tables show the standing costs per year, per week and per hour; the running costs per mile, and the total charge per mile over a range of annual mileages for each size of vehicle, according to the part of the country in which it is based. Factors are included which enable the figures to be speedily adjusted to allow for fluctuations in fuel prices.

Television Station for Ulster

The B.B.C. announces that a contract for building work at the new medium-power television transmitting station at Divis, near Belfast, Northern Ireland, has been placed with McLaughlin & Harvey, Ltd., Belfast. It is expected that building work will start in about two months' time.

New Iron Producing Association

The formation is announced of the British S.G. Iron Producers' Association from among the licensees in Great Britain and Northern Ireland of the process under British Patent No. 630,070 and others for producing spheroidal graphite iron castings. The Association has been brought into being to facilitate the exchange of information on the manufacture of this new material, and to encourage its use in the large diversity of applications for which it is suitable. It is also co-operating with the British Standards Institution in the preparation of a specification. Mr. P. A. Russell and Mr. W. R. Cooper have been elected chairman and vice-chairman, respectively, and Mr. C. Gresty has been appointed hon. treasurer. The Secretariat and offices are at 94/98, Petty France, London, S.W.1.

V.H.F. Transmitters for the B.B.C.

Marconi's Wireless Telegraph Co., Ltd., has secured a further important contract from the British Broadcasting Corporation for fourteen v.h.f. frequency-modulated transmitters, together with associated equipment. These will be used for sound broadcasting, in connection with the B.B.C.'s plan to provide a powerful reinforcement on v.h.f. to the present Home, Light, and Third Programme services. This is in addition to the recently announced contract to supply the B.B.C. with twenty-four $4\frac{1}{2}$ kW and two 10 kW transmitters, thus making a total of forty v.h.f. frequency-modulated transmitters now on order from the company. The latest contract, delivery of which will commence next year, is for transmitters of $4\frac{1}{2}$ kW power. The company is also supplying the necessary phasing units and station monitors.

Institute of Physics

The report of the Institute of Physics for 1953 which was adopted at the annual general meeting held on 18th May records another active year. It states that there was a net increase of 248 members in all grades and the total membership at the end of the year was 4,595. There is every indication that the Institute's graduateship examination, which was held for the first time in 1952, is meeting a definite need; it was conducted in four centres in 1953. The number of candidates for national certificates in applied physics is increasing satisfactorily; there were 151 for the ordinary certificate and 55 for the higher one.

Lighting and Road Safety

The British Electrical Development Association, 2, Savoy Hill, London, W.C.2, has produced a 24-page booklet —" A Matter of Light and Death," aimed at showing the relationship between street lighting and accidents. Official statistics are quoted showing how the accident rate rises during hours of darkness and the planning of lighting systems is outlined, the various types—fluorescent, sodium and mercury—being considered and compared. An attempt is made to compare the costs of the different methods and full co-operation between engineers, manufacturers and lighting authorities is strongly urged.

Change of Name

The name of the parent company of the Brush Group has now been changed from the Brush Electrical Engineering Co., Ltd., to the Brush Group, Ltd.

The name Brush Electrical Engineering Co., Ltd., has been given to the Group's subsidiary company managing the factory at Loughborough.

Trade Announcements

Pyrotenax, Ltd., announces the opening of a new branch office at 19 21, Cabinet Chambers, Lower Basinghall Street, Leeds, 1 (telephone: 27826). The new office, which is under the management of Mr. W. Cameron, will have a demonstration and instruction department where instruction and technical information on the use of Pyrotenax cables can be obtained.

Clarkson (Engineers), Ltd., Nuneaton, have opened a new branch office and stockroom at 430, Crown Street, Glasgow (telephone: South 1942).

The **Earth Boring Machine Co.,** Lake Works, Portchester, Hants, has been formed to handle the " Magco " patent earth boring machine.

The address of **Kent Bros. Electric Wire Co. & E. H. Phillips, Ltd.,** is now Kew Works, Broad Lane, Bracknell, Berks (telephone: Bracknell 881).

The head office address of **British Resin Products, Ltd.,** and **British Geon, Ltd.,** is now Devonshire House, Piccadilly, London, W.1 (telephone: Mayfair 8867).

Catalogues and Lists

Servomex Controls, Ltd., Crowborough Hill, Jarvis Brook, Sussex.—Technical leaflet describing the company's 10 A a.c. voltage stabilizer.

R. & A. G. Crossland, Ltd., Cartbridge Lane, Walsall.—Illustrated priced folder covering the Crossland range of fluorescent fittings for industrial and commercial lighting applications (304–54).

Whitehead Chemical Co. (Waxes), Ltd., Midland Bank Chambers, 77, King Street, Manchester, 2.—Illustrated loose-leaf catalogue containing information on waxes for industry including a section on waxes for the electrical industry—" Electrowax," " Electrojell " and " Cablowax."

Metropolitan-Vickers Electrical Co., Ltd., 1–3, St. Paul's Churchyard, London, E.C.1.—Catalogue of " Metrovick " 8ft fluorescent lamps and fittings (ES.4123/21).

White Electrical Instrument Co., Ltd., 10, Amwell Street, Rosebery Avenue, London, E.C.1.—20-page priced illustrated catalogue of laboratory and educational instruments.

Falk, Stadelmann & Co., Ltd., Farringdon Road, London, E.C.1.—Catalogue of electrical accessories and control units (802).

Leicester, Lovell & Co., Ltd., North Baddesley, Southampton.—" Guide to Resins and Glues for Industry "—a catalogue covering the company's range of synthetic resins, glues, etc.

Fuel Firing, Ltd., Woodley, Reading, Berks.—Technical booklet describing the " Type F.F." initiator as installed at the St. Pancras and Earley power stations.

Standard Telephones & Cables, Ltd., Connaught House, Aldwych, London, W.C.2.—28-page technical catalogue on centralized supervisory control (D/RC.26); catalogue on the " 74701-A " acoustic mill feed controller (C/MT.17); technical leaflet on germanium junction photo electric cells and power rectifiers (F/G.1).

Cooke & Ferguson, Ltd., Manchester, 11.—" Quality Tests "—a technical publication dealing with outdoor oil circuit breakers, metal clad switchgear, isolators, etc. (S.118).

OVERSEAS ELECTRICAL TRADE

Four Months' Level of Exports Maintained

LAST month the total value of British electrical exports, at £14 million, was £2·9 million less than in March and also £1·3 million below the value for April, 1953. Monthly fluctuations are bound to occur when one large shipment at the end of a month may inflate the figures for that month at the expense of the next. The trend of our electrical export trade is therefore better judged by the cumulative totals and in Table I it is seen that the aggregate for the first four months of this year (£59·4 million) is almost the same as for the corresponding period of last year.

Looking at one of the chief sections—generating plant and motors—we find that the total for the first four months of the year has been maintained at £10,404,694 although the April figure of £2,292,046 is below the average. In March, £386,351 worth of plant of this kind was sent to Russia against only £28,638 worth last month and there were also appreciable reductions in the case of Australia (from £282,884 to £194,347), France (from £134,267 to £28,095) and Spain (from £144,722 to £23,570). The value of generating sets of over 200 kW exported since the beginning of the year is now £1,319,719 as compared with £380,685 in the first four months of 1953.

Exports of converting machinery, rectifiers, transformers, switchgear, etc., last month amounted in value to £2,320,815 compared with £2,805,913 in March, a fall which can be largely accounted for by the Easter holidays. The total for the four months to date is £9,969,490 (against £10,208,402). British radio, television, radar and sound reproducing equipment has been in greater demand than last year, with an aggregate figure of £8,506,437 (against £7,407,053) for the four-month period, while in the case of telegraph and telephone equipment there has been a decrease of about half a million pounds to £5,497,636. The principal contraction in overseas purchases has been in wires and cables, exports of which have fallen from £10,972,241 (January–April, 1953) to £7,173,503. The April total of £1,482,950 represents a further decline in this class.

On the brighter side, there have been gains in several

TABLE I.—ELECTRICAL EXPORTS

Class	April, 1954	Four months ended 30th April	
		1953	1954
	£	£	£
Generating sets and generators:			
Diesel-driven, up to 10 kW...	102,115	349,941	390,881
Ditto, 10 to 65 kW	146,447	621,927	506,272
Ditto, 65 to 200 kW	77,429	431,054	251,388
Ditto, over 200 kW	200,451	380,685	1,319,719
Spark ignition engine driven	16,113	116,256	82,284
Steam turbine driven	66,299	991,402	320,834
Other prime mover driven	52,916	124,562	191,261
Generators	195,674	1,040,515	990,731
Parts of generators	319,176	1,949,959	1,732,938
Motors, complete, other than railway, tramway and trolley-bus:			
Up to ½ h.p	173,975	453,069	707,629
Over ½ h.p. but under 1 h.p.	45,417	153,775	181,150
1 h.p. to 250 h.p.	386,144	1,671,584	1,622,959
Over 250 h.p.	120,002	519,078	594,899
Railway, tramway and trolley-bus motors complete and parts of all motors...	158,285	645,550	639,916
Motor starting and controlling gear	231,603	986,158	871,833
Converting machinery	38,080	161,172	119,568
Mercury-arc rectifiers	35,312	231,566	188,143
Transformers for lighting, heating and power (incl. coils)	1,025,124	4,340,162	4,251,084
Switchgear and switchboards (not telegraph or telephone)	1,222,299	5,475,502	5,410,695
Primary batteries:			
Lighting	68,260	208,358	271,016
Radio	145,683	318,503	580,373
Other	50,455	200,927	187,325
Parts (excl. carbons)...	52,927	81,865	240,067
Lamps:			
Filament, exceeding 24 V	73,904	263,077	286,644
Ditto, under 24 V	21,894	82,397	118,785
Discharge lamps, fluorescent tubes, etc.	46,959	159,147	242,440
Other lamps	20,681	72,807	139,522
Radio and television, etc., apparatus:			
Cathode-ray tubes	6,495	34,846	34,910
Other valves (not X-ray)	187,450	713,552	656,678
Radio and television transmitters	64,560	311,444	241,652
Commercial radio and radar equipment	1,048,433	2,945,842	3,991,859
Domestic radio receivers, mains	171,094	847,318	610,595
Ditto, battery	54,011	179,896	210,060
Ditto, other (incl. car)	10,348	73,077	39,668
Radiograms	48,696	194,740	140,474
Television sets	26,027	168,821	65,196
Public address equipment	54,489	204,195	239,785
Sound reproducing app., n.e.s.	11,176	53,788	63,643
Components and parts, n.e.s., incl. parts of valves and c.r. tubes	621,489	1,679,534	2,211,917
Telegraph and telephone installations	627,543	1,951,757	2,499,669
Telephone instruments, separately consigned	95,664	781,697	467,641
Telegraph and telephone parts	427,734	2,563,546	1,821,703
Line apparatus for long distance commun.	121,503	663,177	708,623
Cookers	77,139	197,536	239,910
Toasters	18,284	64,232	66,813
Other cooking apparatus	26,048	71,885	105,044
Parts and accessories	44,754	110 628	148,087
Space heating appliances	51,210	88,973	151,035
Water heating appliances	27,362	110,953	111,837
Other heating appliances	35,301	109,664	150,333
Parts and accessories	41,513	187,921	173,116
Irons	66,324	166,140	253,966
Arc welding equipment, a.c.	57,650	230,152	169,186
Ditto, d.c.	34,802	167,528	186,809
Resistance welding equipment	10,895	41,270	43,109
Magnetos, ignition	13,994	106,607	60,787
Sparking plugs...	144,582	465,519	592,843
Elec. appliances for aeroplanes, n.e.s.	168,498	480,170	882,301
Ditto, for motor vehicles, n.e.s.	226,195	691,054	950,545
Ditto, for cycles, n.e.s.	86,913	222,574	339,285
Signalling app. (incl. traffic signals)	71,728	251,224	244,919
Industrial radio-frequency equipment	16,488	54,813	91,384
Bell app. (not telegraphic or telephonic)	8,137	28,625	34,193
Instruments, commercial	133,665	535.495	595,344
House service meters (not prepayment)	127,980	307,821	460,909
Ditto, prepayment	27,737	43,510	76,931
Electro-medical apparatus (not X-ray)	48,325	140,070	180,728
X-ray apparatus (excl. tubes and valves)	47,914	271,491	179,611
Vacuum tubes	16,660	88,953	79,268
Desk fans	36,721	139,092	126,884
Ceiling fans	85.060	421,778	388,778
Vacuum cleaners	171,961	494,806	771,091
Floor polishers	119,425	181,215	451,683
Food mixers	55,287	151,258	190,388
Hair clippers and dry shavers	75,887	178,342	316,304
Other portable appliances	29,040	78,794	108,532
Parts	59,581	173,447	293,286
Portable elec. tools (not saws) and parts	179,173	564,874	603,194
Cables and wires:			
Telegraph and telephone, submarine	39,229	260,783	244,570
Ditto, other	240,713	2,706,137	1,578,634
Cotton, silk or art. silk insulated	35,618	276,754	163,402
Enamel, glass or asbestos insulated	68,899	362,115	273,099
Paper insulated	411,384	4,304,756	2,449,244
Rubber insulated	434,923	1,868,715	1,555,731
Other	252,184	1,192,981	908,823
Accumulators for motor vehicles	170,153	578,226	648,579
Ditto, traction...	13,253	62,318	101,858
Ditto, radio and other portable	36,837	123,564	132,091
Ditto, other	73,120	234,620	255,052
Parts and accessories	70,662	222,526	253,873
Elec. porcelain, etc. (incl. insulators)	60,613	364,744	353,245
Insulating cloth and tape	46,876	171,462	175,430
Other insulating material	73,000	227,304	311,685
Permanent magnets	38,565	125,354	154,559
Radio, telegraph and telephone testing equipment, n.e.s.	25,388	103,877	153,796
Scientific elec. instruments (not telegraphic or telephonic)	219,349	594,392	764,270
Electrical machinery, n.e.s.	143,963	336,350	498,013
Electrical apparatus and appliances, n.e.s.	507,569	2,364,275	2,195,383
TOTAL	14,074,867	59,497,895	59,434,199

TABLE II.—DISTRIBUTION OF ELECTRICAL MACHINERY, APPARATUS AND APPLIANCES

Country	April, 1954	Four months ended 30th April	
		1953	1954
	£	£	£
Channel Islands	44,507	167,124	204,403
Gibraltar	5,014	91,179	32,815
Malta and Gozo	54,039	133,102	238,386
Cyprus	77,975	181,395	292,312
Sierra Leone	18,892	74,475	52,773
Gold Coast	109,009	399,112	379,508
Nigeria	212,463	792,886	612,976
Union of South Africa	1,928,940	8,028,830	6,523,024
Northern Rhodesia	114,878	524,265	393,101
Southern Rhodesia	243,334	975,422	851,507
Tanganyika	83,293	211,588	200,478
Kenya	129,318	941,621	666,711
Uganda	23,456	223,029	330,226
Nyasaland	8,402	35,400	38,028
Mauritius	60,405	105,628	119,234
Aden	64,973	607,583	444,215
Bahrain, Qatar and Trucial Oman	75,950	351,948	501,584
Kuwait	92,246	645,547	636,843
India	1,143,244	6,731,428	5,296,877
Pakistan	383,027	707,596	2,126,748
Singapore	273,992	1,191,826	1,156,191
Federation of Malaya	168,095	1,164,648	931,683
Ceylon	102,855	579,424	493,323
British North Borneo	13,980	123,602	132,135
Hong Kong	293,253	845,627	715,801
Australia	1,419,738	6,587,497	5,737,858
New Zealand	710,898	3,319,200	3,206,050
Canada	499,316	2,791,971	2,033,713
Jamaica	72,461	224,254	270,211
Barbados	21,995	60,883	56,999
Trinidad	51,809	251,014	326,277
British Guiana	54,841	111,587	172,238
Anglo-Egyptian Sudan	50,342	379,257	382,260
Other Commonwealth countries	95,378	488,019	477,691
Irish Republic	253,246	1,215,903	1,080,841
Soviet Union	59,222	74,879	981,316
Finland	90,763	283,590	405,331
Sweden	430,443	1,159,447	1,370,554
Norway	350,124	922,256	1,010,867
Iceland	25,618	47,317	55,876
Denmark	167,172	329,345	784,324
Poland	95,470	560,401	373,502
Western Germany	96,899	293,075	415,159
Netherlands	617,226	1,586,852	2,232,086
Belgium	218,402	926,558	1,130,650
France	201,782	930,368	1,274,552
Switzerland	94,249	247,430	321,660
Portugal	92,711	399,339	1,051,190
Spain	156,377	1,059,442	984,111
Italy	261,489	837,725	967,557
Austria	25,961	122,528	302,772
Czechoslovakia	5,325	33,849	13,142
Yugoslavia	200,760	273,137	518,025
Greece	95,678	318,734	287,118
Roumania	842	170,601	1,662
Turkey	32,168	544,493	263,142
Netherlands Antilles	13,163	67,076	32,785
Belgian Congo	18,665	153,903	108,628
French Morocco	14,222	139,610	89,062
Angola	6,839	52,531	43,842
Portuguese East Africa	38,125	89,912	104,678
Syria	30,317	98,075	99,290
Lebanon	26,688	132,881	112,902
Israel	47,838	225,961	166,227
Jordan	46,406	43,377	95,815
Egypt	86,510	502,496	406,891
Libya	6,547	79,453	36,261
Saudi Arabia	77,894	164,690	214,355
Iraq	168,586	843,956	837,333
Iran	44,319	80,041	119,640
Burma	137,319	366,985	531,284
Thailand	109,977	594,749	343,611
Indonesia	49,164	355,489	183,482
Japan	29,062	132,600	192,833
United States of America	204,945	735,883	1,038,189
Cuba	23,053	59,522	92,777
Mexico	27,369	98,623	82,579
Colombia	74,684	240,963	234,916
Venezuela	124,242	598,584	563,812
Peru	27,618	114,377	100,790
Chile	68,991	129,717	122,014
Brazil	19,379	355,217	356,697
Uruguay	51,114	63,398	289,945
Argentine Republic	91,641	117,343	389,670
Other foreign countries	135,945	475,247	582,375
TOTAL	14,074,867	59,497,895	59,434,199

kinds of domestic equipment (e.g., electric cookers, space heating appliances, flat irons, vacuum cleaners, floor polishers, etc.), with notable increases in exports of electrical apparatus for aircraft and motor vehicles.

Details of the destinations of the equipment referred to are given in Table II. Although the total April exports were well below those for March, South Africa increased her purchases from £1,715,851 to £1,928,940 and Australia hers from £1,316,737 to £1,419,738.

Besides the equipment included in the tables there are a number of types classified under other headings, including the following (with values for the first four months of this year and last):—Electrically operated washing machines and parts, £1,937,820 (£1,218,931); electric locomotives, £781,162 (£1,225,612); and i.c. engine locomotives with electrical transmission, £732,995 (£222,597).

Imports of electrical machinery and apparatus last month amounted to £1,277,529 (against £762,186 in April, 1953), making the total for the first four months of the year £4,823,369 (against £2,877,512).

Street Lighting Notes

EARLY in 1952 BROMLEY Council adopted a 20-year plan for improving the standard of street lighting throughout the borough involving an annual expenditure of approximately £10,000 subject to Ministry of Transport approval. It included the relighting of 24 miles of main roads and 78 miles of district or side roads. As a first year's programme, it was proposed to convert 1½ miles of Group "A" roads to fluorescent lighting, namely London Road, High Street, Market Square, and Masons Hill. The start of this work was delayed and when approval was finally obtained it was closely followed by the authorization of the second stage, the remainder of Masons Hill, Beckenham Lane, East Street and part of Widmore Road, so the two schemes were carried out simultaneously. There are 151 G.E.C. "Three-Eighty" fluorescent lanterns in the scheme, each housing three 5ft 80 W "Osram" fluorescent tubes.

The contract for the erection of the installation was also awarded to the G.E.C., the design of the installation being carried out by the borough engineer of Bromley, Mr. H. Cliffe. In spite of an increase in the number of light sources from 124 to 151, the use of fluorescent lighting has resulted in a saving to the Council of approximately £370 per annum in energy and replacements.

MIDDLESBROUGH Watch Committee proposes including in its estimates the following street lighting schemes:—Newport Road and Corporation Road, £4,530; Mandale Road, £1,600; The Exchange and Albert Road, £4,200; Longlands Road, £1,500; Stockton Road, £3,000; Cargo Fleet Lane, £6,000; South Bank Road, £1,600; Acklam Road, £6,000; Ayresome Street, etc., £5,000; and Ormesby Road, £7,000. It is also proposed to spend £9,500 on lighting on Corporation housing estates and £3,000 on additional lighting in other areas.

COVENTRY Road Safety Committee has agreed to provide street lighting on private estates which were substantially developed before March, 1950. The total cost is estimated at £19,667. In the case of estates developed since March, 1950, the estate developers are to be required to meet the cost of providing street lighting to Group "B" standard.

LUTON Highways and Planning Committee proposes to submit to the Ministry of Transport for approval a comprehensive scheme for the installation of Class "A" sodium lighting in streets, comprising part of trunk road A6. The estimated cost is £4,200.

Illuminating Engineering Society

Mr. W. R. Stevens, president of the Society for 1953–1954

Proceedings at the Summer Meeting

THE Illuminating Engineering Society's fourth summer meeting which was held at Southport from 18th to 24th May was attended by nearly 450 members and visitors including a welcome contingent of illuminating engineers from overseas. Mr. W. R. Stevens, president I.E.S., gave these overseas visitors a cordial welcome and Monsieur Maisonneuve presented the greetings of the Association Française des Eclairagistes (the French Illuminating Engineering Society) whose 54th meeting, he said, would take place next month at Monaco.

The four days' programme was timed with excellent precision and it comprised six sessions for the presentation of papers, a civic reception, the President's reception and dinner dance and a series of visits. Members had the opportunity of seeing the Mersey Tunnel, a modern Lancashire school, the Tate & Lyle sugar refinery, the works of Siemens Electric Lamps & Supplies, Ltd., and the Dunlop Rubber Co., Ltd. Engineers found much to interest them in the display of new equipment and apparatus assembled in the ballroom of the Palace Hotel—the summer meeting headquarters.

Lighting Equipment Display

The British Thomson-Houston Co., Ltd., demonstrated, *inter alia*, the use of a new 4 W low-pressure fluorescent lamp for instrument lighting in an aircraft cockpit. The lamp which is made in a block long wave transmitting glass is electrically similar to a normal fluorescent lamp, but the particular fluorescent powder converts the short wavelength energy in the discharge to long wave. The lamp operates from the 400 c/s 115 V aircraft supply on a semi-resonant circuit and an electrical dimming control is provided to enable the pilot to adjust the instrument brightness to his requirements.

Siemens Electric Lamps & Supplies, Ltd., showed a 200 W mercury and tungsten dual lamp, consisting of a mercury vapour discharge lamp with a tungsten filament connected in series which not only serves to control the arc current of the discharge section but also acts as a secondary light store.

Five lighting units shown by Holophane, Ltd., are of types which vary from flameproof units certified for use with Group II and III inflammable gases to an aerodrome taxi-track light. The chief feature of the flameproof pendant, certified for use with inflammable gases, is a slightly dished prismatic cover glass which gives the asymmetric distribution necessary to direct the light emission forward on to the panels. The fitting comprises a silicon aluminium alloy casting with a separate wiring chamber, access to which is provided by means of an external removable cover plate at the top. A prismatic reflector, fitted inside the cast hood, effectively controls the light emission from the lamp in the upper hemisphere, directing it down on to the asymmetric prismatic cover glass which re-directs forward on to the vertical surfaces of the panels.

Revo Electric Co., Ltd., displayed a street lighting lantern for a 140 W sodium lamp, made of cast aluminium alloy and incorporating specially formed prismatic panels to provide medium angle non-cut-off distribution, but with the addition of screens to limit the upward emission in conformity with the recently issued M.O.T. Specification, while at the same time permitting a staggered spacing of 135ft at 25ft mounting height, without creating the formation of alternate light and dark bands on the road surface.

Exhibits of the General Electric Co., Ltd., include an Osram 1,000 W underwater floodlight of the type used for illuminating the area scanned by the television camera during the search for wreckage of the B.O.A.C. Comet airliner which crashed off the island of Elba on 10th January. The lamp is able to withstand a water pressure of 650 lb/sq in, so that enclosure is unnecessary, and the fitting is a light and simple reflector giving mechanical protection.

Other features of interest included the British Transport Commission exhibit of a hot cathode fluorescent fitting showing a station name; a station barrier fluorescent fitting; and a 200 W tungsten fitting; Allom Bros., a table lamp made by Waite & Son, Ltd.; Courtney, Pope (Electrical), Ltd., pendant, recessed ceiling fittings and "Atomette" silhouette spotlighting fittings; Falk, Stadelmann & Co., Ltd., Pegasus fitting; Knightshades, Ltd., table lamp using nylon material; Linolite, Ltd., moulded and adjustable fluorescent fitting and reflector; Troughton & Young, Ltd., table lamp and floor standard; Heyes & Co., 40/60 W flameproof handlamp with cable; Benjamin Electric, Ltd., horticultural fitting for plant irradiation designed to meet high irradiation densities, floodlights, a blended light unit, and a deep bowl; Edison Swan Electric Co., Ltd., twin reflector colour blended lighting fitting; Ekco-Ensign Electric Co., Ltd., starter switches for fluorescent lamps and a p.v.c. reflector; Strand Electric & Engineering Co., Ltd., baby mirror spot and long range spot; General Post Office, spring lampholder and plug-in emergency lighting fitting for manual switchboards.

The following are abstracts, summaries and extracts of the papers, and the discussions on them in the order of the presentation of the papers.

Lamps and Their Uses

In his paper under this title Mr. J. N. Aldington, B.Sc., Ph.D., said that the past 25 years had witnessed great technological advances. He contended that developments in light sources had in many instances outstripped developments in their application. There was evidence also that the peculiarly fertile period of the last two decades in lamp development was now merging into a period of consolidation. The primary forces which influenced lamp research in the exciting years following development of mains voltage metal discharge lamps in about 1930, arose from the

engineering aspects of the lamps themselves. To-day, however, it was already evident that user requirements interpreted by lighting engineers were exercising an increasing influence. This was a good thing, for the lamp could not be separated from its use. Nevertheless there were definite features in every light source which stemmed from the fundamental physical and chemical requirements of the materials from which the source was constructed. Some of these were examined in the paper, and the inter-relation between certain features of lamp design and the optimum use were also considered under the following sub-headings: characteristics of radiant energy; some methods for producing light; the evolution of practical light sources; and some factors of lamp design.

It was concluded that there was a significant need for improved lighting in practically every sphere, and sometimes the problem was an educational one. The industrialist needed to be convinced of the benefits of improved lighting standards, and this was true not only in production plants and factories, but in offices and commercial premises. Home lighting called for vigorous and special treatment, for here bad lighting conditions were in general the rule rather than the exception. A great deal had been achieved in this country in improving the standard of road lighting, but the proportion of well lit roads was still deplorably small. In spite of the advances which had been made there was still a gap to be closed between the best that had been achieved in all the varied fields in which lamps were applied and the much lower standards which were tolerated in the majority of lighting applications.

Discussion

In introducing the discussion on Dr. Aldington's paper, Mr. W. J. Jones (London) said he supported the plea that if a lamp was doing its job efficiently attempts ought not to be made to seek for something different. For economic and commercial reasons standard lamps should be used as far as possible. Mr. Jones went on to say how glad he was that firm steps were being taken in England to standardize fluorescent lamps. The B.S.I. was now dealing not only with electrical details of fluorescent lamps, but with the colour aspects as well. Then there was the problem of international standardization. Unless a start was made with this, particularly with reference to colour, a state of chaos could easily develop particularly as fluorescent lamps were an export. It was better to try to marry trends now and try to reach agreement than to wait until the subject became more difficult to handle. Dr. J. W. Strange (London) said that although the practical achievements of electroluminence were limited at the moment, it had great potentialities, and even last year made substantial advances.

Dr. R. G. Hopkinson (London) questioned whether it was the right approach for fluorescent lamp manufacturers to try to match the colour properties of the filament lamp. In the fluorescent lamp there was the opportunity to start right at the beginning to find out what the public liked without reference to any other form of light source.

Mr. W. Gilchrist (Liverpool) said there was an impression that it was expensive to use a good light. That idea must be rejected because charges were more related to actual costs than to what the "traffic" would bear. Many commercial consumers were paying less for lighting than they did before the war. Having arrived at the point where the tungsten lamp had been so far developed that little improvement could be anticipated, had not the time come to standardize in this field and not worry too much about fluorescents? For ordinary common usage, he thought manufacturers must concentrate on 60 W and 100 W lamps, without neglecting the specialized types of lamps which, of course, would always be needed.

Mr. C. C. Smith (Liverpool) said engineers would welcome Dr. Aldington's views on sodium discharge lamps. Had they reached that final form? If not, what were the trends in development?

Dr. Aldington in a composite reply to the points raised in discussion, said that in the matter of standardization in fluorescent lamps, it was desirable to deal with the things which could be properly grouped together internationally and bring these down until agreement could be reached on specific points. If an attempt were made to agree upon specific things now, he would be amongst the first to violently object. He did not think that electroluminescent light sources would compete effectively with existing light sources, though he agreed that the phenomenon had placed a power in the hands of the research worker in his efforts to produce light by new means. Mr. Gilchrist had given a challenge to the lamp industry as a whole. As to the suggestion to eliminate clear lamps and to concentrate production of coated types on certain wattages, well, if illuminating engineers and users would support that plea, lamp manufacturers would, no doubt, consider it as a desirable object.

A Street Lighting Scheme

In his paper "Street Lighting in a Large London Suburb," Mr. Alan T. Durbridge outlined the steps taken by the Harrow Urban District Council in planning the public lighting of a large district so that it could be commenced and carried through in stages as a unified scheme. At December, 1953, some 1,305 lanterns were in commission, and at some yet undefined date the completion of the task would see nearly 10,000 lanterns installed, and the district might well be justified in claiming a Public Lighting Installation second to none. The area in question covered an acreage of about 20 sq miles and had a population of about 225,000. The road system consisted of 44 miles of Ministry of Transport classified roads and 180 miles of unclassified roads.

At September, 1945, the area was almost entirely lighted by gas. Four such shopping centres were chosen and each was equipped with a trial fluorescent installation briefly as follows:

(*a*) Installation of six lanterns equipped with 2 × 80 W tubular fluorescent lamps in lanterns mounted on 25ft concrete columns; road width 30–38ft and spacing about 110ft; the buildings varied from single storey to three storey and included shops and offices.

(*b*) Installation of six lanterns equipped with 4 × 80 W tubular fluorescent lamps in lanterns mounted on 25ft concrete columns; road width 45ft, and spacing 110ft; there was no uniformity of buildings.

(*c*) Installation of six lanterns equipped with 3 × 80 W tubular fluorescent lamps in lanterns mounted on 25ft concrete columns; road width 33ft with an island pavement of 20ft plus a service road of 20ft; spacing 110ft; the buildings were shops surmounted by flats.

(*d*) Installation of six lanterns equipped with 3 × 80 W tubular fluorescent lamps in lanterns mounted on 25ft concrete columns; road width 33ft with 40ft wide pavement on one side and 15ft on the other side; spacing 100ft; the buildings consisted of two- and three-storey combined shops and flats.

In August, 1949, the Council approved a five-year programme for converting the whole of the district to electricity, recommending that fluorescent lighting should be adopted for Group A roads and sodium lighting for Group B roads. The absence of colour distortion provided by the fluorescent lamp was considered to be a great

advantage over mercury and sodium installations, particularly in main roads where there were shops. At that time the total cost of the complete scheme was estimated at £376,000.

It was found expedient to supplement the general scheme with 100 W tungsten lamps for the following locations: to fill gaps in the lighting of residential roads where there were already a number of existing gas lamps; in footways and passages leading through spinneys or short cuts from one estate to another where there was a certain amount of wilful damage; in service roads at the rear of shops, etc. Four 45/60 W sodium lanterns in positions recommended by the Standard Code of Practice had been successfully installed at a number of dangerous cross-road junctions in residential areas lit by gas.

The capital cost in 1951 (date of most recent installation) of a 3/80 W Group A fluorescent installation was £3,872 per mile. Assuming 44 columns per mile of straight road this was equivalent to £88 per column. The running cost was around £12 per lantern per annum, an inclusive figure.

Discussion

Mr. C. C. Smith (Liverpool) said he felt there was need of uniformity of standard, not necessarily uniformity in the type of street lighting. Uniformity of type could produce a most dull and uninteresting result. The use of sodium lighting in shopping areas had been overemphasized. The lighting of a shopping area was a job on its own. Spill lighting from shop windows provided all the colour correction needed for sodium street lighting. Quite pleasant effects could be obtained by a centrally suspended sodium installation in shopping centres. Scouting or inspection of lamps at intervals of seven days was not sufficient. In Liverpool, it was thought necessary to have an inspection every night.

Mr. J. M. Waldram (London) considered that controlled and planned variety in street lighting was very important. If we lit all our districts the same way, we should soon get bored with them.

Mr. F. H. Pulvermacher (Cardiff) considered there ought to be a cheaper way of erecting lanterns 25ft above the road level than by concrete or steel columns. As to scouting frequency, in South Wales the common system was once a week. What sort of lamp life did Mr. Durbridge get from sodium and fluorescent lamps respectively? He, Mr. Pulvermacher, obtained about 5,000 hours from sodium. In South Wales, in the last two years, the use of sodium lamps had increased by 246 per cent, mercury vapour lamps by 130 per cent and fluorescent lighting by 300 per cent.

Mr. G. C. Small (Nottingham) said if lamps were changed at regular intervals in accordance with the rated life of discharge lamps, there would be no need to scout once a day.

Replying, Mr. Durbridge said he was all for maintaining the individuality in street lighting schemes. Although standardization could become a curse, it was necessary in some circumstances. If local authorities wanted frequent scouting, they could have it, but it would have to be paid for. When lamps which had given their rated life were promptly replaced, "outages" would be very small. On the question of the replacing of sodium lamps, Mr. Durbridge said his concern was with the lantern itself and he was asking manufacturers to put a ball joint in the lantern so that it would be easily capable of adjustment. A life of 2,500 to 2,750 hours for sodium lamps would appear about right; fluorescent lamps about 3,500.

Mr. W. Gilchrist suggested that we in this country must think more in the terms of American methods of getting shops to light the streets. The shops were given an allowance for the cost of the electrical energy supplied and the supplying authority made an allowance of half the cost of the service which they were asked to provide.

Plant Growth

In his paper "Artificial Lighting for Plant Growth," Mr. A. E. Canham, M.Sc., said that records of research into the effects of light on plant growth dated back to the eighteenth century. It was, however, only during recent years that the full importance of light as a major growth factor had been appreciated and that satisfactory equipment has been available to enable artificial light to be used with advantage. Recent advances in the development of artificial light sources, together with the increasing importance of using scientific methods in horticulture had, however, resulted in considerable research on the subject.

The author indicated some of the many ways in which light affected the growth of plants and how the effects could be used in practice to improve the growing conditions and to produce an economic return for the grower. Plants, he said, had very specific requirements and for satisfactory results it was essential that the installation should be correctly designed for the particular purpose.

Mr. Cameron Brown said the mercury vapour lamp had been very successful in the last three or four years, but only now were we in the teething stage of its application. The benefits which could be derived from mercury vapour lamps at this stage were modest, but well worth while. Mr. B. Rowe thought it would be a good thing if Electricity Boards appointed specialists to maintain contact with growers so that the new applications could be developed as fully as possible. Mr. F. Jackson also expressed views on the subject.

Industrial Lighting

In a symposium on "The Economics of Four Industrial Lighting Installations" each author dealt with a particular installation. Mr. S. T. Clark ("A Hot Cathode Fluorescent Installation") dealt with the installation in a wool textile mill. After outlining the processes, the lighting requirements and the choice of light source, he said if a good system of lighting was required hot cathode fluorescent lighting was cheaper than tungsten lighting for the woollen industry, and no other factor was necessary to convince the woollen manufacturer of the value of such an installation. The improvement of illumination alone, say, from 8 to 20 lm/ft², or from 20 to 40 lm/ft², did not necessarily bring about improved production. There was not the slightest doubt that, while tests were being taken and interest shown, the operative would be spurred to increased output.

In "A Cold Cathode Fluorescent Installation," Mr. W. Howe, A.M.I.E.E., dealt with the installation of a large engineering factory where high quality precision work was carried out. The employment of shift workers meant that artificial lighting was in almost continuous use. The combined lighting and power requirements of the plant entailed very heavy consumption of electricity, whilst the repetitive nature of the work ensured that maximum demands could be monitored and the load factor maintained at a high level. The combination of these circumstances resulted in an advantageous tariff, an important factor in deciding the type of lighting. The author concluded that for the given conditions the cold cathode system was more economical. In a section using 600 four-lamp fittings, after nearly 10,000 burning hours, only three single lamps had been replaced as faulty and there had been no failures of transformers or other components. A total of nearly 2,600 four-lamp fittings were used throughout the whole installation. Cold cathode

lighting provided a valuable addition to the resources of the illuminating engineer, but he emphasized that there was no intention to recommend this form of lighting for all or any general circumstances.

Dealing with the installation in a heavy engineering works in "A High Bay Mercury Lighting Installation," Mr. F. Jones said it was decided to replace the existing lighting in the crane shop of a large engineering works and four factors had to be considered when deciding the type of lighting to be used:—(i) an average illumination of 15 to 17 lm/ft² was required for the bay, in which marking out and detailed construction work were carried on. Good distribution of lighting was required, as many large and tall crane structures were erected in this shop; (ii) it was desirable that the number of fittings should be as small as possible to minimize the inevitable interruption to production while the fittings were being installed; (iii) to facilitate erection and wiring it would be necessary to use the overhead travelling cranes which would only be available for limited periods during the day and at the week-ends; (iv) the shop was on day and night shifts, so again the smaller the number of fittings the less the interruption caused when cleaning and maintaining the units. The lighting fittings used had vitreous enamelled canopies and anodized aluminium reflectors. Heavy duty connecting pieces on top of the units were so constructed that the complete reflector could be easily removed without disturbing the circuit wiring.

Blended Light

"A Blended Light Installation" was the title of a paper by Mr. G. W. S. Levey who dealt with the installation in a steel works. He said that blended light had been defined as light which was a mixture of the radiations from two or more sources which had dissimilar spectral characteristics. A mixture of mercury vapour discharge and incandescent filament sources was selected for lighting the Abbey Works of the Steel Company of Wales, Ltd.

The speed of movement of the product and the need for good general lighting for adjustment and maintenance of the complicated plant justified values of illumination which would have been considered uneconomical in older works. The operatives were also used to good natural lighting by day and therefore required the highest level of illumination which was economically possible at night. Design values in the blended light areas were: slab yards, melting shop, raw materials bay, ingot stripping, soaking pits and brick stores 6 lm/ft²; mould preparation and rolling mills 12 lm/ft²; slab inspection and conditioning, cold strip mills, sheet and plate finishing and machine and roll lathe shops 20 lm/ft².

In view of the rapid depreciation of reflecting surfaces and lamps in a steelworks three types of fitting were considered:—Type 1: fittings designed with open tops to allow convection currents to carry dust away from the reflecting surfaces; type 2: totally enclosed fittings; type 3: fittings which could be easily cleaned.

Commercial Lighting

Mr. André Claude summarized his paper "The Decorative Approach to Commercial Lighting" as follows:—Fluorescent light sources, by their characteristics, had completely upset the classical lighting techniques previously in use and had set new problems in the decorative quality of commercial lighting installations. No decorative lighting for commercial purposes and no luminous sign could be truly satisfactory unless the scheme that was to be carried out by the lighting engineer had in the first place been conceived by an artist pursuing an æsthetic conception regardless of the ultimate purpose of the installation. The author recommended that fluorescent light sources used in such installations should have a predominantly red spectral emission. Incandescent sources could be usefully combined with fluorescent sources. The completed lighting scheme should include one or more spots of colour, either light sources or lighted surfaces, which served as total points of reference by which the colour value of the general lighting could be located.

Home Lighting

Messrs. Arthur H. Young and C. J. Messelbrook, B.Sc., summarized their paper under the above title as follows: Homes were now being built on a vast scale in this country and it was appropriate that some thought should be given to their lighting. After a short review of the developments in domestic lighting over more recent years, the various materials used in the manufacture of lighting fittings were discussed. Some of the principles of lighting planning were set out with indications of the more important points which should be considered in the main rooms of the home. The difficulty of reconciling these principles with the personal preference of the user was stressed. The lack of interest in fluorescent lighting in the home was discussed. In dealing with aspects of electrical safety a suggestion was made that the scope of the Electrical Testing House should be extended by the adoption of an approval system for the safety of lighting equipment. Some indication was given of future trends.

Annual General Meeting

Officers appointed at the annual meeting were as follows:—President: Mr. E. C. Lennox (Newcastle); vice-presidents: Mr. H. G. Campbell (London), Dr. W. E. Harper, Mr. C. S. Caunt (Nottingham), Mr. A. G. Penny (London) and Dr. J. W. Strange (London); hon. treasurer: Mr. E. B. Sawyer (London); hon. secretary: Mr. H. C. Weston (London); hon. editor of Transactions: Mr. C. Bicknell (London).

Mr. W. R. Stevens, president, in giving the report of the Council, stated that for the first time in the history of the society there had been a small drop in membership. Consideration was being given to what must be done to improve the situation. One of the best things of the year had been the starting of a new group in the Transvaal.

Mr. C. C. Smith, who proposed the adoption of the report and accounts, said the report of the Council stated that the total membership of the Society at the end of 1953 was 2,339. The Council was endeavouring to ascertain the cause of the decrease and was reviewing the activities of the Society with a view to making membership attractive to more people.

It had been hoped to publish a new edition of the I.E.S. Code. The alterations and additions which were being made were rather matters of presentation than matters of fundamental principle.

Annual Dinner

Nearly 350 persons attended the annual dinner which was held at the Palace Hotel during the meeting.

Mons. Jean Chappat, who proposed the toast of the Illuminating Engineering Society, expressed gratification that such cordial relationships existed with the corresponding Society in France.

Mr. W. R. Stevens, president I.E.S., said that one of the things the organization could do outside its normal functions was to cement good relations, and particularly in intertwining friendship with those overseas.

The toast of "The Guests" was proposed by Mr. J. F. Stanley. Mr. D. H. Kendon, chairman of the Mersey and North Wales E.B., replied.

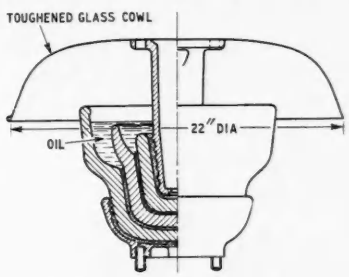
Large Power Systems

CONTINUING the International Conference on Large Electric Systems (C.I.G.R.E.), on 17th May, delegates got to work on what was virtually a co-ordination of the items considered in other sections, that is transmission at very high voltages. The element of integration was exemplified by a report on the progress of the British 275 kV system by Sayers, Lane and Forrest (B.E.A.), which was cross-referenced with nine groups of papers. The particulars given differed in some details from the preliminary account given at the 1952 conference, chiefly as a result of more recent load estimates and generating plant programmes. The authors stated that for the 1960 scheme contracts had now been placed for about half of the 2,457 miles of double circuit lines as well as for 94 circuit breakers and 44 120 MVA 275/132 kV auto-transformers. Double-wound 13·8/275 kV, three-phase transformers of 106 and 125 MVA were now being designed for three new generating stations. Available generating capacity at peak was taken as 88 per cent of maximum capacity.

Most of the transmission circuits were less than 70 miles long, the maximum being 120 miles, and their carrying capacity was limited only by temperature rise of the conductors. Early conversion of a section to experimental 380 kV working was under consideration. At least 10 per cent more generating capacity would be required without area interconnection, which would cost £84 million (including 350 MVA of reactive compensation) against £110 million for only 5 per cent more generating plant and local transmission.

The existing 132 kV system would be divided into sections interconnected only at 275 kV. Two cables for that voltage, one of the impregnated pressure type and the other oil-filled, were now under service test at the Staythorpe station. The first was designed for a maximum electrical stress of 110 kV/cm with a gas pressure of 200 lb/sq in and the second for 130 kV/cm and an oil pressure of 15 to 20 lb/sq in. Four-break bulk-oil designs and six- and eight-break air-blast designs of circuit breakers were to be installed. Unit tests would shortly be made up to 100 per cent conditions corresponding to 25·8 kA and a recovery voltage 1·5 times the phase-to-earth voltage. The 275 kV lines were insulated with 18 cap-and-pin anti-fog units with a total leakage distance of 300in.

Experiments with oil-bath insulators in areas with polluted atmospheres had shown them to be immune from flashover due to non-uniform voltage distribution. Impulse strength could be improved by substituting toughened glass for the metal of the cowl. In such atmospheres semi-conducting ceramic glazes gave excellent performance under the worst conditions but at present tended to deteriorate owing to electrolytic corrosion.



Oil-bath post insulation unit

The planning of the 275 kV system was discussed by Chorlton and Painter (B.E.A.) and Whitaker (London E.B.). Key factors were stated as the short-circuit capacity required of switchgear at the higher voltages and the stabilization of the fault effort to be imposed on existing distribution systems. The splitting of the 132 kV system into groups would reduce the level of short circuit currents within the group. Maintenance of voltage stability and regulation necessitated close-coupling of the 275 kV system. With 900 MW of generating plant switched at 275 kV the maximum short-circuit duty would be 7,800 MVA in 1960 rising to 10,000 MVA during 1960–65, compared with 3,500 MVA now on the 132 kV grid. The short-circuit levels at the lower voltage busbars of points of supply to Area Boards were restricted to 750 MVA at 32 kV and 250 MVA at 11 kV. In dealing with the densely loaded London area (see *Electrical*

Mr. C. Allsop (Bruce Peebles), Mrs. Allsop, Mrs. Smith and Mr. D. H. Smith (Bruce Peebles)

Review, 26th February) progress would entail minimizing the use of costly switchgear and developing less expensive substation layouts.

Sporn (U.S.A.) briefly set out particulars and proposals for systems for voltages above 220 kV. Reports from countries concerned indicated that equipment will be available.

A full description of the O.V.E.C. project (the *ad hoc* Ohio Valley Electric Corporation) was given by Sporn and Marquis (U.S.A.). The scheme provided for the supply of 1,800 MW and 15,000 million kWh per annum to the Atomic Energy Commission and entailed the building of two generating stations (of indoor construction) having a combined capacity of 2,200 MW made up of 200 MW turbo-alternators, each associated with one reheat boiler, and a 330 kV double-circuit transmission line. The value of network analysers in coping with rapidly increasing loads when changing over part of the Ontario system from 25 to 60 c/s was mentioned by Floyd (Canada).

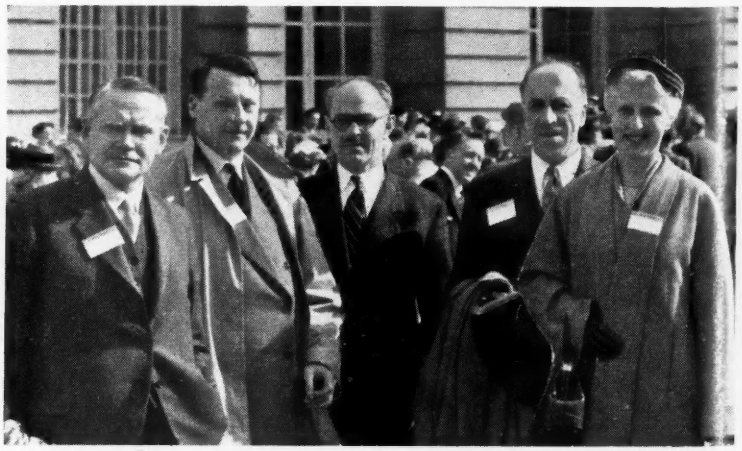
Discussions on cables provided the alternative fare in which Brazier (B.I.C.C.) in a special report referred to the eleven papers considered as reflecting developments in thinking since the last conference; five of these referred to pressure cables for the highest voltages and two to their sealing end equipments. Another paper (Bertaux, France) dealt with flexible joints of the same diameter as the cable, which is related to the possibilities of submarine cable links. A further French contribution made reference to the possibility of increasing dielectric strength near the conductors by screening them with semi-conducting tapes. Tests up to 1,450 lb/sq in indicated that 250 lb/sq in was the highest pressure to have any value.

Seamless aluminium-sheathed cables, possessing a strength and rigidity that made reinforcement unnecessary, thus reducing cable weight, provided a subject for Hollingsworth (B.I.C.C.). Its slightly greater rigidity, compared with that of lead, had not, he said, proved a serious disadvantage in installation and the protective servings developed for steel-reinforced lead-sheathed impregnated pressure cable were completely adequate to provide for a greater susceptibility to corrosion when laid underground. Jointing of aluminium-sheathed cables involved a new plumbing technique, which presented no special difficulties, and was simplified by the absence of reinforcement. The higher conductivity substantially increased sheath losses for large single-core cables, but reduction in rating could be modified by insulating the sheaths. At present the length of cables was limited by the use of tubes for sheathing, but the development of seamless aluminium sheaths by direct extrusion would make them comparable with the lead-sheathed type.

A novel combination of the field-shield and correctly positioned condenser grading methods of stress control for high voltage cable terminations was described by Lee, Jennings and Stevens (Standard Telephones & Cables), who concluded that by this means the size of porcelains could be reduced, provided pollution tests were satisfactory. Raising the position of the condenser grading above the optimum position increased negative and decreased positive flashover values, while lowering it produced the opposite effect.

As to whether short-circuit capacity of cables was determined primarily by mechanical forces or by thermal damage to the dielectric, a mathematical investigation into the former was described by Giaro (Italy). For the first time at C.I.G.R.E. the direct connection of h.v. cable into transformer or switch tanks was mooted, when the use of oil-immersed sealing ends was raised by Gazzana-Priaroggia (Italy).

Modifications in the London high voltage cable system to meet the present load of 1,600 MW and a 1962–63 load of 2,850 MW were described by Irving (London Electricity Board), who reviewed methods adopted to meet operating problems (see *Electrical Review*, 26th February). Underground high voltage cables (5,000 miles, including 750 miles at 22 kV and above) had proved among the most trouble free items of all electrical apparatus. Feeder-transformer arrangements had great economic advantages in reducing the amount of switchgear required. The running in parallel of private plant subject to technical



Mr. H. Astbury (Crompton Parkinson), Mr. W. A. McNeill (Cooke & Ferguson), Mr. P. d'E. Stowell (Merseyside and N. Wales E.B.), Mr. E. T. Norris (Ferranti) and Mrs. Norris

safeguards had proved quite feasible; only two of these had surplus capacity. District heating ducts having a maximum surface temperature of 17 deg C raised the temperature of cables by 14 deg C when they crossed the ducts at right angles and 10in below them. Injection systems of supervisory control of public lighting had been interfered with by the 11th harmonic due to rectifiers on the railways. Cables alive at 22 kV could safely be spiked.

Summarizing the information presented on lightning and surges on the following day, Forrest (B.E.A.) drew attention to contrasting practices in different countries regarding the use of lightning arrestors, e.g. in Britain and Sweden. The interconnected network of Britain, he remarked, did not favour their use as it was inherently less vulnerable to surges, which were also more liable to fail in the polluted atmosphere of industrial areas. Berger pointed out that an arrestor which would withstand a surge of 10,000 A for 20 micro-seconds might be damaged by, say, 200 A for 1,000 micro-seconds and recommended that arrestors for protecting transformer l.v. windings should withstand five discharges of 500 A for 2,000 micro-seconds at one-minute intervals.

Shunt capacitors, according to Roth and Strickler (Switzerland), reduced over-voltages on switching out transformers by 20 per cent. The change-over of the earthing system of the R.W.E. 220 kV network from Petersen coil to solid earthing was explained by Roser (Germany) as due to the superiority of the latter on extensive systems, which confirmed experience in other countires.

In Room B a discussion on d.c. transmission at high voltage was introduced by a paper by Nagzi (Japan), who first described the operating characteristics of mercury-arc rectifier-invertor installations up to 10 MW, installed as 50 to 60 c/s frequency changers, and their parallel running with alternators. Theoretical particulars were given of self-excited invertors for use when there was no leading voltage on the output side. The experience gained was expected to facilitate investigations into the practicability of transmitting d.c. from hydro-electric stations in the four main islands to numerous smaller islands 25 to 600 miles distant.

Two late papers described 100 kV cable transmission of 10 MVA from the Swedish mainland to the Baltic island of Gotland with particulars of convertors and their control and operation for about three weeks after an initial fault in cable had been repaired up to 5th May; the breakdown was due to mechanical damage only.

Intermission from technical meetings was provided on Wednesday by visits to the Fontenay research and testing station of Electricité de France in the morning and to the Palace of Versailles in the afternoon. At Fontenay the delegates inspected the switchgear testing plant, connected directly to the 225 kV network, where circuit breakers can be tested at voltages from 5 kV to 225 kV and for voltage steps up to 400 kV for short-circuit powers of from 1,000 to 3,200 MVA. At the cable testing station six types of 225 kV cables are under test and two 132 kV submarine cables for the Channel crossing. A 3,600 kV impulse wave generator and a power frequency installation are other features. The adjacent Central Laboratory of Electrical Industries houses the French National Standards and has facilities for precision measurement and material quality verification. At the Palace, the visitors were privileged to attend a reception and dance in the Galeries des Batailles, the first function of its kind ever held there.

Returning to the lecture theatres the next day, the members had opportunities of discussing protective relays in one and overhead line towers in the other. In the first, Warrington (English Electric) stressed the importance of minimum maintenance time, through simplification and

Mr. E. Tobin (Hackbridge & Hewittic), Mr. H. S. Holbrook (B.T.H.) and Mr. G. D. Russell (Ohio Brass Co.)

standardization of designs and circuits, rather than of the development of new types. The induction principle had the best overall characteristics and was applicable to 95 per cent of present requirements. For the remainder, electronics were required mostly to cope with electrical conditions at a distance, i.e. carrier protection; their sensitivity, low burdens and consistently high speed (possibly one-cycle operation on any faults) were advantages, but their complexity and high cost and certain other drawbacks limited their scope. Development of new devices, like transistors, would hasten the trend towards electronic relays, but they probably would not replace electro-magnetic relays generally for many years.

The last day of the technical sessions (Friday, 21st May) was allocated to consideration of system stability in Room A and overhead lines in Room B. Stability questions were raised principally under the three heads of network analysers, frequency control and series capacitors. Accounts of work done at Imperial College, London, and Manchester University on the development of prototype computers to meet the need for less expensive machines for the solution of simpler network problems were given by Humphrey Davies, Slemon and Hakim (a semi-automatic digital computer) and by Adamson and Aranin (an impedance-type a.c. network analyser). It was shown by Holder (Metropolitan-Vickers) that a network analyser could be used with advantage even for a long single-line radial transmission. Experiences with these machines in the planning, protection and operation of electrical systems were given by Cahen and Chevallier and in Canada by Duff. Concordia (U.S.A.). Maintenance of frequency relations between networks by the impulse method and predictions of fluctuations in power exchanges between networks, corresponding to any shape of load curve, were discussed by Cuénod (Switzerland), Jacques and Renchon. Particulars of the automatic frequency regulation employed in France were given by Cahen and Chevallier and in Canada by Duff. A reduction of 15 per cent in transmission costs by the installation of series capacitors in the Swedish 380 kV system was claimed by Jancke, Smedsfelt and Hjertberg—a finding that was generally supported by Demuth and Harrington (U.S.A.) in relation to the Bonneville 230 kV scheme. There was a consensus of opinion that deionization at a fault permitted a dead interval of up to 0·25 second to be assumed for both single-phase and three-phase circuit breaker reclosure. To lessen effective line reactance, it was stated, quadruple conductors would be provided for the first 380 kV line in Western Germany to be commissioned in 1957.

An important feature of the discussion on overhead lines

referred to by Silva (Italy) and by Jobin related to the possibility of reducing the length of insulator strings and hence the cost of towers. The ground for this suggestion was that the effect of wind action in diverting the strings from the vertical had probably been overestimated and clearances to the earthed towers were greater than necessary. Measures to counteract the limitations to the life of conductors caused by vibrations of small amplitude were submitted by Steidel (U.S.A.). Experience in the U.S.A. and Sweden appeared to favour large clamps with a high moment of inertia, whereas in Switzerland a contrary opinion prevailed.

Six papers by authors describing developments in the U.S.S.R. were received too late for incorporation in the original co-ordination procedure of the special reporter. These related to large hydro-electric generators, self-synchronizing for paralleling generators, automatic reclosure, distance and carrier current protection, impulse-discharge voltages across insulation as related to the shape of the voltage wave, and supplies for agriculture from large power systems.

After the close of the Conference on Saturday, 22nd May, there was a choice of visits to hydro-electric stations. One was to the four plants built on the River Dordogne (Massif Central) and to a fifth under construction which, with a total fall of 1,200ft, utilize the whole potentialities of the river; the aggregate alternator capacity of these stations is 835 MVA and their output is transmitted at 220 kV, which in one line to Paris will later be raised to 380 kV. The second tour was to the André Blondel station in the Rhône Valley, which is designed for an ultimate capacity of 300 MW, and the third to Malgovert in the Isère Valley and Génissiat. The 600ft dam at Tignes serving Malgovert (320 MVA) was inaugurated last year and is at present the highest in Europe and has a storage capacity of 187,000 acre-feet. The dam at Génissiat (280,000 kVA) was built to facilitate navigation on the Rhône and improve irrigation as well as to provide electricity.

Coal Industry in 1953

N.C.B. Report and Accounts

LAST year miners in this country for the first time had two weeks' paid annual holiday instead of one, but the greater part of the loss of output resulting from this reduction in working time was made good by the end of the year, and coal production in 1953 was only about two days' output less than in 1952, although there were seven fewer working days. During this period, British mines produced 212·5 million tons of coal, about 1·8 million tons less than in 1952. Fewer working days meant that five-day week output was less but more voluntary working on Saturdays produced 11·6 million tons, a million tons more than in the previous year. Output from open-cast workings, at 11·7 million tons, was less than in 1952.

Overall productivity had fallen in 1952 but in 1953 it regained the 1951 level of 1·21 tons a man-shift. Productivity at the face fell by 0·01 to 3·14 tons a man-shift. Another fact disclosed by the report for 1953 of the National Coal Board (H.M. Stationery Office, price 8s) is that, although the total number of men employed fell during the year from 721,000 to 710,000, the average number of men working at the face (300,000) was higher than in any year since the war.

The financial result of the year's operation was a surplus of £353,647, compared with a deficit of £8·2 million in 1952, and the accumulated deficit since vesting date was reduced to £13·6 million. Total costs of coal at 59s 2d per ton rose by 2s 6d per ton due to increases in wages and other costs. The Board spent £64·3 million on capital account during the year compared with £48·6 million in 1952.

The continued mechanization of the pits calls for a higher standard of skill on the part of the mechanics and electricians responsible for keeping the machines in working order, and for the many thousands of electricians already in the industry a training scheme was begun which provided an intensive five-day refresher course.

During the last four months of 1953 industrial coal consumption continued to increase compared with the previous year, but, with much milder weather, space heating requirements were lower and domestic consumption was less than in the latter months of 1952. As the biggest of the National Coal Board's consumers, the electricity industry used 36·7 million tons during 1953, an increase of one million tons over the previous year. Power stations, using 2¾ per cent more coal during the year, sent out about 6 per cent more electricity than in 1952 and saved at least one million tons of coal by increased generating efficiency. Although sales by Area Gas Boards were also higher during most of the year than in 1952, there was such a sharp fall in the last four months that the total sales of gas were less than in 1952. Gasworks used less coal—27·2 million tons in 1953 as compared with 27·8 million tons in the previous year. The steady fall in coal consumption by the railways, achieved mainly by technical improvements, electrification and by greater use of diesel and diesel-electric locomotives, was continued in 1953 (13·8 million tons), with a reduction of 2·2 per cent on 1952 (14·1 million tons).

During the year covered by the report, the standard of safety was higher and fewer men were killed and injured in British mines than in any year for which there are records. There was no major disaster, and the number of men killed was 364 (45 fewer than in 1952) and the number injured in "reportable" accidents was 1,907 (166 fewer than 1952).

New developments have overcome previous obstacles to automatic a.c. winding. In the past, even with automatic d.c. control, speed has not been entirely independent of load, but these modern developments now enable a means of speed-load compensation to be incorporated, as well as marked improvements in the control of acceleration and electrical braking, which should make it possible to adhere to a prescribed speed cycle such as is needed for satisfactory automatic winding under all conditions. During 1953 the first large automatic a.c. winder incorporating these features was installed at Lynemouth Colliery, Northern (N. & C.) Division.

The first experimental trolley locomotive in British mines was installed at Sandhole Colliery, N.W. Division, in July, 1953, and it is reported that this has worked well. The electrogyro locomotive is the most interesting new development; this method of energy storage for traction purposes has been introduced in Switzerland. In essence the equipment comprises a large fly-wheel coupled to a motor which brings the wheel up to a speed when connected to an electricity supply at convenient points. In use, the fly-wheel drives the motor which acts as a generator and supplies power to the traction motors until the slowing down of the fly-wheel makes re-speeding necessary.

V.h.f. radio telephones have been installed in some coalfields for communication purposes. Similar equipment can be used for the control of shuntings in large sidings, etc. Below ground normal radiocommunication appears to be impracticable but experiments are being made with radiocommunication where there is a suitable conducting medium such as shaft winding ropes, rails, pipes, etc. Two types of equipment are being tried and experiments have reached the stage where large-scale trials are justified.

Royal Society Soirée

Apparatus Shown at Burlington House

THE annual conversazione of the Royal Society was held on Thursday of last week, 20th May, at Burlington House, London, in connection with which the customary exhibition of apparatus was arranged to illustrate recent discoveries and fresh methods of investigation in many diverse branches of science.

For example, Dr. E. J. Bowen, F.R.S., Mr. B. Brocklehurst and Mr. D. Tanner (Physical Chemistry Laboratory, University of Oxford) showed that when radiated with ultra-violet light some substances re-emit longer-wave light as fluorescence. If two fluorescent substances are present together in solid or liquid solution the light energy may be absorbed by one of the types of molecule and the fluorescence emission come from the other. When this occurs, excitation energy must pass from one molecule to another. The effect depends on resonance between the molecular energy levels, and on the molecules being within a certain distance, which may amount to as much as 50 Å.

Another item of particular interest to electrical engineers was the demonstration of the enhanced thermoelectric effects from new semi-conductor junctions by Mr. R. W. Douglas and Mr. H. K. Goldsmid (General Electric Co., Ltd.). The Peltier heating or cooling at a junction between dissimilar conductors is usually negligible compared with the resistance heating. Even under the most favourable conditions the greatest cooling that has previously been reported is only 9 deg C. Recent theoretical and experimental work has, however, led to a junction between a new semi-conductor, bismuth telluride, and bismuth capable of producing a cooling of 26 deg C. The demonstration included the production of ice on the passage of a current through the junction and, also, the corresponding heating effect after reversal of the current.

Density Changes in Solutions

An apparatus was shown by Dr. Q. H. Gibson (Department of Physiology, University of Sheffield) for recording optical density changes in solutions, observation beginning 3 msec after mixing of the reactants. The solutions are contained in two ml. syringes and are driven through an eight-jet mixing chamber into the observation tube. Flow is arrested suddenly by a special device and the changes in the stationary fluid recorded with a photomultiplier and cathode-ray oscillograph.

When a current is passed through neon containing, for example, a trace of argon, the argon rapidly migrates to the cathode end of the tube. This is seen visually as a striking change in the colour of the discharge which quickly changes from orange to blue; the more argon that is present the greater the length of the blue part of the discharge. Quantitative determination of the percentage of argon present can be made photoelectrically or by other means. Even with simple apparatus the proportion of argon can be estimated over the range of 1 part in 10,000 up to 1 part in 50, when the total gas pressure is a few millimetres. The effect was demonstrated with various rare gas mixtures by Mr. E. H. Nelson and Mr. S. A. R. Rigden (G.E.C.).

Mr. R. H. James (Civil Aviation Signals Training Establishment, Ministry of Transport and Civil Aviation) showed an audio analogue of a radar set in which sound wave pulses, of 1 msec duration and 6 kc/s frequency, are transmitted by a highly directional loudspeaker which is used as a microphone for the reception of echo signals. The signals are amplified in a tuned receiver and after detection and " video " amplification are applied to a long persistence cathode-ray tube to produce either an A scan or P.P.I. type display. Range marks are provided at 5ft intervals. The range resolution is approximately 6in and the angular resolution is a few degrees. The minimum range is a few inches and the maximum range is variable from approximately 10ft to 100ft.

Deep Sea Telephone Repeaters

The exhibit by the Post Office Engineering Department, Research Station (contractors, Standard Telephones & Cables, Ltd.), consisted of a British Post Office type of deep sea telephone repeater, the complete electrical assembly of which is hermetically sealed within a brass sleeve. The amplifier unit of this assembly was also shown separately with the screens removed. Seven repeaters of this type are being laid this year in a cable between Scotland and Norway and will enable the cable to carry 36 high grade telephone circuits. One feature of the amplifier is that it consists of two mu paths in parallel with one beta path. Almost any type of fault can be tolerated in one of the mu paths without appreciably degrading the system.

Finally, there was a scale model of the 250ft aperture steerable radio telescope which is now being built at the Jodrell Bank Experimental Station in Cheshire. The idea of the telescope emerged in 1948 and 1949 when the large Jodrell Bank transit radio telescope showed its value in the investigation of the galactic and extra-galactic radio emissions. In the spring of 1952 the Department of Scientific and Industrial Research and the Nuffield Foundation announced their willingness to share the cost of the instrument. The foundations have been piled in places to 90ft underground and this work, together with the laying of the 350ft diameter 17ft gauge double railway track, was completed early this year. The main superstructure is now being erected, and it is hoped that preliminary tests of the telescope will begin in 1955. The weight of the superstructure will be about 1,200 tons of which nearly 500 is in the paraboloidal bowl and back girder. The elevation and azimuth control will be by 100 h.p. electric motors and the instrument will be capable of sidereal motion with a positional accuracy of 10 minutes of arc. When complete the radio telescope will be used in all branches of radio astronomy and physics of meteors, the aurora borealis, and for lunar and planetary investigations. The engineering consultants are Messrs. H. C. Husband of Sheffield, and the steelwork contractors Messrs. United Steel of Scunthorpe, who loaned the model.

Gold Coast Scheme

THE Prime Minister of the Gold Coast, Dr. Nkrumah, on 11th May officially opened the new Achimota–Tema–Shai Hills railway line. This represents the first stage in the construction of the new port at Tema in connection with the Volta River hydro-electric scheme.

Insulated Wires and Cables

Government Acceptance of Monopolies Commission's Recommendations

LAST week in a written reply to a question by Mr. Swingler, the Minister of Supply (Mr. Sandys) announced the Government's acceptance, with certain reservations, of the recommendations of the Monopolies Commission in its report on the supply of insulated electric wires and cables.

This report was summarized in the *Electrical Review* of 4th July, 1952. The Commission found that the requirement of the Cable Makers' Association (C.M.A.) and Covered Conductors Association (C.C.A.) that members should submit new designs and types to their associations for approval was necessary in order to maintain quality and had been reasonably administered.

It was considered that a system of purchasing mains and " super tension " cable would have to be worked out by the British Electricity Authority and the industry in their common interest. The arrangement by which C.M.A. members' costs were investigated by independent accountants was in the public interest. There should be a reasonable direct relationship between prices to buyers other than the B.E.A. and those charged to the B.E.A., but the Government does not endorse the Commission's recommendation that this relationship should be made known.

Mr. Sandys said that this would be contrary to well established commercial and Government practice but the associations had been asked to furnish the information to the Government from time to time.

The system of common prices for rubber cable and the C.C.A. system of common prices for covered conductors should be ended. As a defence against extreme price cutting the associations should be permitted to fix minimum prices giving no more than a reasonable profit to the lowest cost producer of each type.

The G.P.O. should leave itself free to place a proportion of orders for land telephone cable with independent concerns and take steps to ensure the protection of the public interest for all purchases of telephone cable outside the bulk orders. *The Government does not accept the proposal that price agreements for sales of telephone cable to purchasers other than the G.P.O. should be brought to an end but it has asked for an assurance that the prices charged bear a reasonable relationship to those paid by the G.P.O.*

If further bulk orders were placed their existence should be publicly announced and provision should be made to safeguard the continuance and development of efficient independent competition.

The quota systems and system of allocations operated by the associations should be ended. The covenant by which British Ropes, Ltd., undertook not to make cables should be allowed to lapse.

Co-operation of the C.M.A. and C.C.A. on the questions of quality clauses in B.S.I. specifications was welcomed by the Commission which recommended that clauses governing the quality of insulating materials should be included in all B.S.I. cable specifications. It was considered that the patent policy of the two associations had been liberal.

It was recommended that the Government should continue to keep a watch upon the copper position to ensure that supplies were fairly allocated or that competitive supplies were available. No recommendations were made regarding import restrictions.

The Commission recommended the ending of the following arrangements:—The exclusive dealing provisions in agreements with wholesalers and other buyers of rubber cable; aggregated quantity rebates and association rebates in connection with rubber cable; the rebate paid to N.E.C.T.A., Ltd., on purchases by its members of mains cables; the C.C.A. aggregated quantity rebates; and its agreements with buyers who undertook not to make covered conductors.

Mr. Sandys said that if the associations were prepared to give an assurance that they would bring their arrangements into conformity with the Commission's conclusions (with the two exceptions noted) by 31st December next, it would not be necessary to make an Order under Section 10 of the Monopolies Act.

Electric Vehicles in 1953

THE report for the year ended 31st December last of the Electric Vehicle Association of Great Britain, presented at the recent annual meeting, gives the number of full members as 29 (against 30) and of associate members 26, including the B.E.A.M.A. (against 33). Sub-committees, panels or delegations were appointed to deal with special matters including the possible expansion of the Association's scope and membership; a proposed users' division; associate membership; and safeguarding measures against accidents with electric vehicles.

Advertising in users' trade journals was continued and 2,000 copies of the booklet, " The Electric Vehicle Reduces Local Delivery and Collection Costs," were distributed to potential users and to members and Electricity Boards. A four-day vehicle exhibition was held at the Surrey Sub-Area headquarters of the South Eastern Electricity Board, Dorking; plans are being made for an exhibition at Leeds next year. Contact was maintained with the National Dairymen's Association and the Institute of Public Cleansing.

After persistent efforts the Association last year secured total exemption from purchase tax of battery electric (goods) road vehicles. Certain difficulties encountered by members are being taken up with the Customs & Excise authorities.

Negotiations with the Ministry of Transport regarding the provision of safety (locking) devices on pedestrian-controlled vehicles and visibility safety measures on driver-seated vehicles led to an amicable understanding. Other negotiations with the Ministry concerned certain anomalies in connection with driving licences and the operation of pedestrian-controlled vehicles. The Ministry of Supply consulted the Association on export questions and the Board of Trade was approached about the adverse effect of the Hire-Purchase Regulations on the sale of electric vehicles.

The Association has been accepted as a member of the Council of the British Electrical Power Convention (to be represented by the secretary, Mr. V. W. Dale) and has become a member of the British Standards Institution.

At users' request the Association negotiated with Electricity Boards on several occasions regarding battery-charging tariffs, with satisfactory results in a number of cases. The journal *Electric Vehicles* is being revived as a quarterly.

An appendix to the report shows that there were 1,147 new vehicle registrations during 1953 (against 1,194 in 1952). Of these the largest class was the 12–16 cwt (unladen weight) type (495); there were 284 in the 1–1½ ton class and 212 in the 16–20 cwt class. In addition there were 251 (against 278) vehicles exempt from Road Fund licence; 659 (against 736) pedestrian-controlled vehicles; and 417 (against 505) invalids' vehicles. Thus the total of new registrations was 2,474, compared with 2,713 in 1952. It is stated that at the end of the year there were in use 19,747 driver-seated vehicles and 9,353 pedestrian-controlled vehicles—a total of 29,100.

More Farms Connected

IN THE year to 31st March last the number of farms connected by the North Western Electricity Board exceeded 1,000 for the first time since vesting day. This was stated last week by Sir Joseph Hallsworth, the chairman, during a Press tour of farms and agricultural undertakings in the Clitheroe area of Lancashire to demonstrate how electricity is helping to raise output and efficiency. In the current year the Board plans to spend £475,000 on taking power to rural communities. Sir Joseph said that by next March the Board would have provided electricity supplies to seven out of every ten farms in its area.

Sir Joseph Hallsworth, chairman of the North Western Electricity Board (left), with Mr. R. H. Harral, manager of the Board's No. 5 Sub-Area (right), discussing rural electrification problems with a farmer, Mr. George Towler, of Bashall Town Farm, near Clitheroe

Distribution Plans

The North Eastern Electricity Board proposes to erect 20 kV overhead lines to supply Little Stainton, Old Wheatbottom housing estate, Crook, Middlestone Moor housing scheme, Spennymoor, the television station at Pontop Pike, Cornsay Village and Whitton, and a line between the Hart Moor and Seaton Carew Works substation for an increased supply to the South Durham Steel & Iron Co. L.v. overhead line construction is proposed in connection with the transfer of the East and Middle Rainton network from the N.B.C. to the Electricity Board, and conversion of the existing 3 kV system to 20 kV from Coxhoe Bridge substation, Coxhoe.

Further Power Plant for Chile

The programme of the Chilean Corporation for the Development of Production (CORFO) for this year includes a 45,000 kW hydro-electric power plant at Pullinque in the Province of Cautin, which is to cost 900 million pesos. A plant at Los Cipreses, designed to augment supplies for Santiago, is expected to be completed in June.

Rural Electrification

Two volumes of reports upon rural electrification have been issued by the Technical Assistance Administration of the Economic Commission for Europe, Food and Agriculture Organization. The introduction to Volume I explains that these reports are the outcome of a decision of the Committee on Electric Power to undertake a four-part study of the subject and were prepared by a Joint Technical Study Group which met in Geneva in 1952. This volume contains reports by Mr. A. Dussarte (Electricité de France) on electric power production; by Mr. T. R. A. Strand (Sweden) on transmission and distribution; and by Mr. J. Mercier (Electricité de France) on economic, financial and administrative questions.

The second volume deals in two parts with the application of electric power in agriculture; the first is by Mr. C. A. Cameron Brown (British Electricity Authority) and the other by Mr. F. Ringwald (Switzerland). These publications can be obtained from the Sales Section, European Office of the United Nations, Palais de Nations, Geneva, Switzerland; Vol. I (163 pp.), 11s, Vol. II (165 pp., 20 illustrations), 9s.

Financing Street Lighting

Street lighting and accident prevention representatives from many parts of Yorkshire who attended a conference at Leeds recently discussed the cost of street lighting. The question was raised by Mr. J. M. Ellis, of Leeds, who asked if there was any chance of getting some contribution from the Road Fund as motorists seemed to create the need for good street lighting. Mr. L. A. Doxey, street lighting engineer of Leeds, pointed out that when the Road Fund was established one of its purposes was to ensure road safety. Mr. A. Hutchison, of the Yorkshire Electricity Board, suggested that the Association of Public Lighting Engineers should make an appeal to the Government.

Mr. E. B. Sawyer, manager of the Lighting Service Bureau, London, thought that there was a case for the national Exchequer to be responsible for the running costs of lighting on the main traffic roads while in some cases the more wealthy authorities might assist by continuing their street lighting a little beyond their own boundaries. Mr. Sawyer declared that the cost of accidents in this country in one year would pay for all types of street lighting necessary in the next 25 years.

Electricity Boards' Sales

The accompanying table analyses the sales of Electricity Boards during April. The national figures show an increase over April, 1953, of 6·6 per cent, but when corrected for weather conditions which were warmer than a year earlier the increase is 8·0 per cent.

ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for April (million kWh)			Twelve Months Totals Ended 30th April (million kWh)		
	1953	1954	Inc. or Dec. %	1953	1954	Inc. or Dec. %
London	455·2	484·2	+ 6·4	5,587·9	5,754·0	+ 3·0
South Eastern	270·6	292·7	+ 8·2	3,231·0	3,432·4	+ 6·2
Southern	314·7	334·4	+ 6·3	3,775·5	4,025·3	+ 6·6
South Western	152·2	169·3	+ 11·2	1,814·7	1,979·2	+ 9·1
Eastern	433·6	463·5	+ 6·9	5,249·7	5,567·8	+ 6·1
East Midlands*	372·3	381·2	+ 2·4	4,491·2	4,726·6	+ 5·2
Midlands*	493·3	522·7	+ 6·0	6,009·8	6,370·1	+ 6·0
South Wales*	270·3	308·4	+ 14·1	3,339·3	3,646·8	+ 9·2
Merseyside and N. Wales* ...	276·1	295·4	+ 7·0	3,359·9	3,584·7	+ 6·7
Yorkshire*	482·9	510·0	+ 5·6	5,871·1	6,215·2	+ 5·9
North Eastern*	294·8	304·5	+ 3·3	3,512·8	3,719·5	+ 5·9
North Western*	536·1	570·2	+ 6·4	6,410·1	6,966·5	+ 8·7
South-East Scotland	106·6	111·0	+ 4·1	1,247·1	1,344·4	+ 7·8
South-West Scotland* ...	254·4	262·7	+ 3·3	3,017·8	3,199·6	+ 6·0
Total all Area Boards ...	4,713·1	5,010·2	+ 6·3	56,917·9	60,532·1	+ 6·3
Direct Supplies by Central Authority	77·4	94·2	+ 21·7	785·2	1,032·7	+ 31·5
Grand Total	4,790·5	5,104·4	+ 6·6	57,703·1	61,564·8	+ 6·7
Mainly Industrial Areas* ...	2,980·2	3,155·1	+ 5·9	36,012·0	38,429·0	+ 6·7
Mainly Non-Industrial Areas	1,732·9	1,855·1	+ 7·1	20,905·9	22,103·1	+ 5·7
Total Number of Effective Working Days	26·81	26·81				

* Those in which industrial consumers took over 50 per cent of the total sales in the preceding financial year.

STOCKS and SHARES

THE stir created by the Bank Rate reduction having subsided, the gilt-edged market has returned soberly to a more normal course of business. British Government stocks and their satellites gave way rather sharply in the early part of the week owing, in the main, to renewed uncertainty as to what may be the likely outcome of the Geneva conference. Falls in Consols and War Stock brought about heaviness throughout the list as a whole. In the industrial markets, conditions have been quieter than of late, but, at the same time, prices are reasonably strong. The "averages" broke through to yet another fresh peak a week ago, with the aid of some more good company news and dividends. Sir Ronald Weeks' confident review of affairs at the Vickers annual meeting helped engineering shares generally.

Further Improvements

Lancashire Dynamo shares have added 1s 3d to the previous week's gain of 3s. Ward & Goldstone at 51s 6d are 5s 3d to the good. Others to improve by 1s or more on former advances include I.C.I., Electric Constructions, Plessey, R. A. Lister, Thornycroft and Lucas. Aerialites and Hackbridge Cable continued to rise, while Wolf Electric and Scottish Cables were also marked up well. Desoutters and Morphy-Richards registered gains. The leaders of the electrical equipment market were at least very firm, with G.E.C. beginning to reflect interest in the coming annual results. There were some wide swings in Vactrics, which further jumped from 13s 3d to 20s before reacting to 16s 6d.

B.I. Callender's

The balance sheet and accounts now issued by British Insulated Callender's Cables show that Sir Alexander Roger is relinquishing the chairmanship with the company in strong financial shape, and well equipped to meet the more competitive conditions to which he refers in his accompanying review. As was already known from the preliminary figures, the outcome to 1953 was an increase of over half a million in the group's net surplus, despite the drop of more than a million in the trading profit below the exceptionally high figure for the previous year. The main reason for this was a large reduction in the tax requirements. In the event, the maintenance of the ordinary distribution at 10 per cent leaves room for allocations on the customarily grand scale to reserves, which now exceed the amount of the issued capital.

The 5s shares of the Telephone Manufacturing Company responded promptly to the announcement of the annual results, the quotation being marked up from 8s to 8s 6d. The final dividend again brings up the total for

Week's Price Changes

Company or Board	Nom. Value	Middle price 24th May	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	92⅛	+⅛	3	3	3 4 9	92⅛	88⅞
Brit. Elec. 1974/77	100	91⅛	+⅛	3	3	3 5 6	91⅛	87⅛
Brit. Elec. 1976/79	100	96⅛		3⅛	3⅛	3 12 6	97	93 11/16
Brit. Elec. 1974/79	100	105		4⅛	4⅛	4 1 0	105⅛	103 7/16
Overseas Electric Supply								
Calcutta Elec.	£1	20/-		6†	6†	6 0 0†	20/7	18/7
East African Power	£1	23/-		7	7	6 1 9	23/4	20/7
Nigerian Elec.	£1	24/-	+6d	10	10	8 6 8	25/-	23/6
Palestine Elec. "A"	£1	20/-	+6d	Nil	Nil	Nil	20/-	16/-
Perak Hydro-Elec.	£1	14/-	−3d	Nil	6	8 11 6	15/6	13/9
Equipment and Manufacturing								
Aberdare Cables	5/-	8/9	+3d	25	12½*	7 2 10	8/10	8/1
Aerialite	1/-	12/3	+9d	88⅛	88⅛	7 4 3	12/3	10/9
Allen, W. H.	£1	60/-		15	15	5 0 0	60/-	50/-
Aron Elec. Ord.	£1	47/6		15	20	8 8 6	47/6	43/-
Assoc. Elec. Ord.	£1	50/6	+6d	20	11¼*	4 9 0	50/6	41/6
Automatic Tel. & El.	£1	73/9	+2/6	15	15	4 1 6	74/-	62/9
Babcock & Wilcox	£1	56/9		18	12*	4 4 6	57/-	47/3
Baldwin, H. J.	2/-	4/6		20	20	8 17 2	5/6	3/9
Bakelite	10/-	27/-	+9d	12½	12½	4 12 6	27/6	23/6
British Aluminium	£1	36/6		12	10	5 9 6	40/-	34/6
B.I. Callender's	£1	43/6	+1/6	10	10	4 12 0	44/-	37/9
B.I. Callender's 6% Pref.	£1	26/-		6	6	4 12 3	26/-	24/3
British Thermostat	5/-	28/9xd	+6d	35	27½*	4 15 9	28/9	17/6
British Vac. Cleaner	5/-	13/6	+9d	25	25	9 5 2	14/6	11/6
Brook Motors	10/-	36/6		20	20*	5 9 6	36/6	33/3
Brush Ord.	5/-	6/9xd	+3d	4	6	4 9 0	7/-	3/6
Bulgin, A. F.	1/-	3/3		30	30	9 4 6	3/7	3/2
Burco	5/-	14/6		35	35	6 0 8*	14/6	12/1
Chloride El. Storage	£1	59/6		20	12½*	4 4 0	59/6	46/6
Clarke Chapman	£1	55/6	−9d	17½	20	—	57/6	47/6
Cole, E. K.	5/-	29/6	−1/6	25	25*	4 4 9	31/-	22/6
Cossor, A. C.	5/-	8/-		10	10	6 5 0	8/11	7/-
Crabtree	10/-	29/3	+6d	17½	17½	5 19 8	29/6	23/9
Crompton Parkinson Ord.	5/-	17/9		11½	20	5 12 9	18/-	14/-
De La Rue	5/-	14/6	+9d	35	Nil	Nil	14/10	12/3
Decca	4/-	38/3		150	35*	—	38/3	28/9
Desoutter	5/-	18/9	+6d	18	20	5 6 8	18/9	16/1
Dewhurst	2/-	6/-		19	19	6 6 9	6/3	5/1
Dictograph Tel.	2/-	6/-xd		20	20*	6 13 4	6/3	5/2
Dubilier Condenser	1/-	5/9	−3d	28	25*	4 7 0	6/-	4/1
E.M.I.	10/-	14/-		12	8	5 14 4	14/9	11/3
Electrical Components	5/-	11/3		20	20	8 17 10	11/6	10/9
Elec. Construction	£1	60/-	+1/3	15	15	5 0 0	60/-	53/-
Enfield Cable Ord.	£1	20/-	−9d	5	Nil	Nil	22/3	16/6
English Electric	£1	45/9		15	10*	4 7 6	45/9	38/-
English Electric 3¾% Pref.	£1	16/6		3¾	3¾	4 11 0	16/6	15/3
Ericsson Tel.	5/-	25/9	−6d	22†	25†	2 8 6†*	26/3	22/9
Ever Ready	5/-	35/-	−6d	35	40	5 12 9	37/-	26/-
Falk Stadelmann	£1	38/9		15	15	7 14 9	41/-	36/6
G.E.C. Ord.	£1	44/6	+9d	22½	11¼*	5 1 0	44/6	37/6
G.E.C. 6½% Pref.	£1	27/-xd		6½	6½	4 16 3	27/3	26/6
General Cables	5/-	16/9		30	30	8 19 2	16/10	16/6
Greenwood & Batley	£1	43/9		15	17½	8 0 0	44/-	40/3
Hackbridge Cable	5/-	15/3	+6d	20	20	6 11 2	15/3	11/3
Hackbridge & Hewittic	5/-	21/3		20	20	4 14 0	21/3	16/10
Hall Tel. Acc.	10/-	11/-xd		10	10	9 1 9	11/11	10/7
Heatrae	2/-	4/9		12½	12½	5 5 3	4/9	4/-
Henley's	10/-	18/6	+3d	10½	10½	5 13 6	18/6	15/6
Holophane	5/-	14/9		20	20	6 15 7	15/-	13/1

* After capital bonus † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

t e year to 10 per cent, the rate distri- b ted on the four previous occasions, a hough last year's interim was paid o smaller capital. Net group profit f 1953 rose, according to the pre- li inary statement, by the best part of £100,000, to £155,000. Of this, only about £41,000 is involved in the dividend distribution on the £750,000 ordinary stock, so that the company is able to double last year's appropriation for the general reserve. The yield on the shares comes down to a little under 6 per cent.

... Electrical Investments

Company or Board	Nom. Value	Middle price 24th May	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.								
Hoover	5/-	35/9		25	45	6 5 9	36/-	26/3
I.C.I.	£1	62/9	+1/3	13	15	4 15 3	63/-	52/9
Intl. Combustion	5/-	23/-		15	20	4 7 0	23/-	14/6
Johnson & Phillips	£1	48/6	−1/-	15	15	6 3 9	52/3	48/6
Lancashire Dynamo	£1	55/-	+1/3	12½	14	5 1 9	55/-	43/-
Laurence, Scott	5/-	19/3xd		15	20	5 4 0	19/9	14/-
Lister, R. A.	£1	43/6	+1/-	9	12	5 10 6	43/6	31/9
London Elec. Wire	£1	46/3xd	+1/3	15	10*	4 6 6	46/3	38/-
Lucas, J.	£1	65/9	+1/3	9½	10$\frac{5}{6}$	3 6 0	65/9	50/3
Marryat & Scott	2/-	6/6		22½	22½	6 18 6	6/6	5/11
Mather & Platt	£1	70/-		12½	15	4 5 9	70/-	53/1
Metal Industries	£1	34/3	−6d	15	12*	7 0 2	42/3	29/6
Midland Elec. Mfg.	£1	67/6		15	15	4 9 0	67/6	63/-
Morphy-Richards	4/-	17/-	+6d	40	40	—	17/-	11/4
Murex	£1	55/6		15	15	5 8 0	56/3	50/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/6	2/-
Oldham & Son	1/-	3/-		35	17½*	5 16 8	3/4	2/5
Parnall (Yate)	5/-	6/9	+6d	6	8	5 18 6	6/9	4/3
Parsons, C. A.	£1	51/3	+1/3	12½	7½	2 18 3	51/6	38/1
Plessey	5/-	47/-xr		25	30	—	54/-	37/10
Pye Deferred	5/-	23/6	−6d	18	20	—	24/-	15/7
Revo	10/-	19/6	+6d	27½	27½	—	19/6	16/7
Reyrolle	£1	82/6	+1/3	12½	13¾	3 6 8	82/6	66/-
Rheostatic	4/-	12/-		19	20	6 13 4	12/9	11/-
Richardsons Westgarth	5/-	11/-xb		12	15	—	11/-	6/6
Scottish Cable	4/-	15/-	+6d	32	20*	5 6 8	15/-	12/11
Siemens Ord.	£1	43/6		10	10	4 13 0	43/9	34/9
Smith (England), S.	4/-	11/-	−3d	12½	15	—	11/3	7/8
Southern Areas	£1	18/6xd		5	6	6 9 9	20/-	17/6
Strand Elec.	5/-	8/3		17½	17½	10 12 3	9/3	8/6
Sturtevant	5/-	37/3		18·1†	18·9*†	2 10 9†	37/3	29/-
Sun Elec.	£1	32/6		15	15	9 4 8	32/6	27/6
Switchgear & Cowans	5/-	12/9		22½	10	3 18 6	13/7	9/9
Taylor Tunnicliff	5/-	11/-		25	12½*	5 13 9	12/4	10/7
T.C.C.	10/-	30/-		20	30*	—	30/-	21/3
T.C. & M.	£1	31/6		10	8½*	5 8 0	34/6	30/3
Telephone Mfg.	5/-	8/6	+6d	10	10	5 17 9	8/6	7/6
Thorn Elec.	5/-	17/6		12½	12½	3 11 5	17/6	13/3
Thornycroft	£1	40/-xd	+1/9	15	15	7 10 0	40/-	33/4
Tube Investments	£1	65/-xd	+9d	15*	15	4 14 0	68/9	60/3
Vactric	5/-	16/3	+3/-	Nil	Nil	Nil	17/6	7/6
Veritys	5/-	6/-		10	12½	10 8 3	8/3	5/-
Walsall Conduits	4/-	51/3		70	70*	5 9 3	51/3	44/-
Ward & Goldstone	5/-	51/6	+5/3	45	45*	4 7 3	52/-	41/3
Watford	2/-	6/-		25	22½*	—	6/3	4/7
Westinghouse Brake	£1	67/-	−6d	14	15	4 9 6	68/10	60/9
West, Allen	5/-	14/3xd		15	17½	6 2 10	15/3	12/7
Wolf Electric	5/-	13/3	+1/-	15	17½	6 12 0	13/10	11/-
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A Ord.	100	82½		—	6	7 5 6	89½	—
Ord.	100	52½		—	3¾	7 2 10	55½	52
Anglo-Portuguese	£1	23/-		8	8	6 19 2	23/4	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	46/-	−6d	25	35	3 16 0	46/6	39/1
Cable & Wireless:								
Ord.	£1	39/-	−1/-	8	9	4 12 3	40/6	26/2
4% Loan	100	98½		4	4	4 1 3	98½	95½
Calcutta Trams	£1	17/6		6†	2½†	—	19/3	17/1
Cape Elec. Trams	£1	15/-		5½	5½	7 6 8	15/3	12/4
Marconi Marine	£1	32/-	+6d	10	10	6 5 0	32/-	27/6
Oriental Tel. Ord.	£1	77/-		16	16	—	80/6	73/9
Telephone Props.	£1	4¼		8	8	—	5$\frac{1}{16}$	4¼
Telephone Rentals	5/-	10/-xd		10	10*	—	10/3	9/1

Richardsons Westgarth

Richardsons Westgarth 5s shares are now quoted ex the bonus issue, the old shares being 11s and the new a fraction higher by virtue of their being transferable free of stamp duty while in allotment letter form. They rank equally for dividends and in all other respects. With the financial year ended last March, the annual dividend and preliminary results are expected in July. It is the company's practice to make a single payment for each year. On the last occasion, the dividend was raised from 12 per cent to a well-covered 15 per cent, which would have been equivalent to 11¼ per cent on the present amount of capital, as enlarged by the one-for-three bonus. On that basis, the yield on the shares is 5·1 per cent.

Bonuses and Dividends

Announcements of capital bonus distributions are accompanied almost invariably these days by advice in the form of that mentioned above in the case of Richardsons Westgarth. It happens, of course, that over the past year or so a great majority of the numerous share bonuses have in fact had as their sequel an increase in dividend payments. The electrical market has seen this happen during the past few months in the case of such companies, for instance, as A.E.I., Chloride Electrical, British Thermostat, Decca, Dubilier, Sturtevant, Parsons, Reyrolle and L.E.W. Furthermore, as is often pointed out, the process can be regarded as a perfectly logical one: the bonus, as a rule, results from the capitalization of reserves built up over years by the retention of profits, and the larger dividend materializes from the resultant expansion of the business concerned. At the same time, Babcock & Wilcox are not the only company to have given a recent reminder that there is nothing automatic about the sequence.

Ever Ready Preference

Up to the present the preference stock of Ever Ready (Great Britain) has been entitled to a fixed cumulative 7 per cent dividend, plus an extra 3 per cent after 7 per cent has been paid on the ordinary capital. With very little likelihood of any threat to the 3 per cent participation, the company is now proposing to consolidate the dividend into a cumulative 10 per cent, the rate which has been paid for many years. The shares in question stand at about 37s, to yield 5·4 per cent. In the annual report the chairman gives a good account of progress during the last year, when group profits exceeded a million for the first time, and of the further outlook. The price of the 5s ordinary shares, now 35s, has retained most of the substantial rise occasioned by the restoration of the 40 per cent rate of dividend.

REPORTS and DIVIDENDS

Johnson & Phillips, Ltd.—The annual meeting was held on 20th May when Mr. G. L. Wates (chairman and joint managing director), who presided, said that the trading balance for 1953 was just over £600,000 and was less than the previous year's trading balance by approximately £100,000. This difference was entirely accounted for by the rubber cable business. During the year the prices of rubber cables were reduced several times as a result of reductions in the prices of certain raw materials and because of a revised British Standard Specification. The introduction of lower selling prices caused a fall in the value of the cables in stock, both at home and abroad, the whole of which had been borne in the current trading account. The Paper Cable Department and the departments manufacturing switchgear, transformers and capacitors, had done well, and in the aggregate had increased their sales. The Capacitor Department was being completely overhauled and was already beginning to show good results.

Overseas branches had not done so well as in the previous year. In particular, both Australia and South Africa had met with increasing competition and with lower margins of profit. India and Pakistan had both done well. During the year under review the Contracts Department had completed a number of large cable installations in oil refineries, chemical works and in power stations of the B.E.A. The latter in particular had provided scope for the use of aluminium sheathed cables.

A factory had been purchased at New Cross which extended over four acres. When the factory was reconstructed it would house the Switchgear and Capacitor Departments and possibly one or two others.

British Insulated Callender's Cables, Ltd.—The annual meeting will be held on 10th June in Liverpool.

In his circulated statement Sir Alexander Roger (chairman) says that 1953 has not been an easy year from the point of view of production. In certain of its activities the group has enjoyed a good load factor, but in others this has been erratic, particularly where copper is mainly involved. Abnormal experiences have been the flooding of the Erith works, and an explosion last August in the copper refinery.

In some activities turnover was increased and in others well maintained, but in the copper wire mill products and in power cables substantial reductions were experienced. The other main factor affecting business in 1953 was the growth of competition, particularly from European and Japanese manufacturers in overseas markets.

A programme of research and development work commenced some years ago has enabled the company to produce new forms of mineral insulated cable, and arrangements for commercial production are nearing completion. "Nypren" has been added to the "Pren" cable range for aircraft. Another important development has been the marketing of "Unifire" cables for aircraft fire detector circuits. Progress has been made with fundamental studies of the physics of electrical breakdown of dielectrics, and a laboratory has been established specializing in the field of radio-activity.

Although there has been an increase in the intake of orders since last autumn, the days of having long order books are over and they are back to the pre-war position in many products with delivery and price becoming of increasing importance. This applies particularly to overseas business.

Sir Alexander refers to his forthcoming retirement and the proposed appointment of Mr. W. H. McFadzean as chairman.

The Ever Ready Co. (Great Britain), Ltd., is holding its annual meeting on 10th June. In his circulated statement Mr. E. N. Rowbotham (chairman) says that in spite of the difficulties which still exist regarding import quotas and foreign exchange, the export turnover again shows a substantial increase over the previous year. At the same time home sales have been well maintained in general and there has been a marked increase in sales of "Alldry" battery-operated radio receivers. It would seem clear that the reductions in selling prices which have been made have contributed materially to the expansion of the business and profits, and they have recently taken a further step by reducing the prices of batteries used in hearing-aid equipment. The current trading year has started satisfactorily which gives reason to think that sales will be well maintained both in the home and overseas markets.

Enfield Rolling Mills, Ltd.—In the course of his circulated statement on the company's activities during 1953, the Earl of Verulam (chairman) says that in August the copper refinery was returned to the company by the Ministry of Materials after fourteen years. During this time the company has run it as agents for the Government and has refined over half a million tons of copper for the Ministry. The company now sells wirebars, cakes, billets and ingots under the registered brands of E*R for electrolytic, and ERM for high conductivity fire refined. Competition in most of the products became very much keener during the year. Normal progress was maintained in the brass, zinc and aluminium departments.

Hopkinsons, Ltd.—The annual meeting was held on 21st May. In his circulated statement, Mr. R. L. Brown (chairman and managing director) said that the works had been employed to capacity throughout the year under review. Export orders were 14 per cent above the figure for the previous year. Export sales were in excess of orders, and the arrears of outstanding orders had been reduced.

Simms Motor Units, Ltd., reports profits for 1953 of £672,294, as compared with £463,458 for 1952. Taxation requires £477,675 and reserves receive £150,000. It is proposed to pay a dividend of 35 per cent for the year on the £300,000 ordinary capital, as compared with 30 per cent for 1952 on capital of £250,000 before the 20 per cent scrip issue.

The Aberdare Electric Co., Ltd., reports a net profit, before taxation, for the year ended 31st March last of £42,860, as compared with £52,227 for 1952–53. It is proposed to pay a dividend for the year on the ordinary and "A" ordinary shares of 8 per cent. A similar distribution was made for the previous year on smaller capital.

New Companies

Universal Electrical Service (Walsall), Ltd. — Registered 24th March. Capital £10,000. To acquire the business of conduit manufacturers carried on by J. Holmes and A. M. Holmes at Bath Street, Walsall, as Universal Electrical Service. Directors: J. Holmes, A. M. Holmes, D. T. Wigley, and Miss Amie Pursehouse (secretary). Regd. office: Bath Street, Walsall, Staffs.

Rileys Electricians, Ltd.—Registered 12th March. Capital £500. To acquire the business of an electrical engineer and contractor carried on by Harold Riley at 115, Holloway Road, London, N.7. Directors: H. Riley and Irene E. Judd. Regd. office: 115, Holloway Road, N.7.

L. Wagstaff & Sons (Engineers), Ltd.—Registered 13th March. Capital £2,000. Electricians, electrical and mechanical engineers, radio engineers, experts and contractors, etc. Directors: L. Wagstaff and Mrs. Jean L. Wagstaff. Regd. office: Florence Street, Sale, Ches.

Allied Control Co., Ltd.—Registered 25th March. Capital £100. To acquire patents, brevets d'invention, licences, concessions or any interests therein. Power is taken to carry on the business of manufacturers and repairers of and dealers in dynamos, motors, relays, armatures, magnetos, batteries, etc. Solicitors: Herbert Smith & Co., 62, London Wall, E.C.2.

Temlow Electronics, Ltd.—Registered 25th March. Capital £100. Directors: F. E. Templeman and F. A. Marlow. Regd. office: 1, Broad Street Place, Finsbury Circus, E.C.2.

Rotheroe & Mitchell, Ltd.—Registered 3rd May. Capital £30,000. Electrical and mechanical scientific instruments, precision, research, general mechanical and electrical engineers, etc. Directors: J. R. Rotheroe, E. D. T. Vane and A. F. Bowman. Solicitors: Lindus & Hortin, 43/4, Albemarle Street, W.1.

Douglas Gill of West Kirby, Ltd.—Registered 1st May. Capital £1,000. Electrical engineers and contractors, manufacturers of and dealers in telephonic and sound reproducing machines, television and radio sets, etc. Directors: D. Gill and Beryl E. Gill. Regd. office: Column Road, West Kirby.

Nikal Supplies, Ltd. — Registered 7th May. Capital £2,500. Electrical engineers and manufacturers of electrical equipment and articles, etc. L. P. Goddard is permanent director. Regd. office: Senior Works, Church Road, Staines, Mdx.

Bankruptcies

L. Peel, of and lately carrying on business at 216, Low Lane, Horsforth, near Leeds, electrical engineer.—Trustee, Mr. W. H. Meredith, 29, East Parade, Leeds, Official Receiver, released 13th May.

A. S. Bennett, lately carrying on business at South View, Webb's Avenue, Stannington, Yorks. — Trustee, Mr. J. B. G. Moore, 55, Queen Street, Sheffield, 1, Official Receiver, released 13th May.

L. J. Anthony, carrying on business in co-partnership with another at 6, Dolphin Lane, Boston, Lincs., under the style of Dolphin Electric Co., electrical, radio and television engineer.—Last day for receiving proofs for dividend 1st June. Trustee, Mr. C. G. Compton, 2, New Street, Boston.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 7th July from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1949

30435. Standard Telephones & Cables, Ltd.—Electrical calculating circuits. 24th November, 1950. (711561.)

1950

3770. Ott, W.—Röntgen-ray apparatus. 14th February, 1950. (711691.)

3881. Philco Corporation.—Magnetic deflection means for cathode-ray tubes. 15th February, 1950. (711692.)

18052. Electroacustic Ges.—Pulse echo locating apparatus employing pulses of acoustic vibrations, more particularly for locating shoals of fish or like purposes. 19th July, 1950. (711469.)

24900. Automatic Telephone & Electric Co., Ltd.—Circuit arrangements including low-frequency relaxation oscillators. 10th October, 1951. (711535.)

1951

1918. P.A.M., Ltd., and Harris, A. W.—Thermionic valve relay circuits. 25th January, 1952. (711595.)

4717. Ferranti, Ltd.—Tape-reading apparatus. 7th May, 1952. (711482.)

5029. Tipping, W. F.—Electric water heaters. 3rd March, 1952. (711483.)

6185. Leeds & Northrup Co.—Load control systems for electrical generating units. 14th March, 1951. (711485.)

7835. Metropolitan-Vickers Electrical Co., Ltd.—Electrical gating circuits. 4th April, 1952. (711734.)

9126. Electric & Musical Industries, Ltd.—Adjustable devices, especially voltage attenuators employed in circuits for mixing electrical signals. 16th April, 1952. (711600.)

10415. British Thomson-Houston Co., Ltd.—Projection of stereoscopic motion pictures. 29th February, 1952. (711602.)

14472. Electric & Muscial Industries, Ltd.—Manufacture of photo-electrically sensitive or secondary electron emissive surfaces. 16th June, 1952. (711709.)

15016. Standard Telephones & Cables, Ltd.—Methods and means for producing visible marks on a recording medium. 20th June, 1952. (711607.)

18182. Electric & Musical Industries, Ltd.—Tools for mounting elastic sleeves on rods, cables, insulated conductors and the like. 15th July, 1952. (711499.)

18781. British Thomson-Houston Co., Ltd.—Luminescent material and methods of preparing same. 9th August, 1951. (711547.)

18982. Wright, E.—Thermally operated electric switch. 13th August, 1952. (711613.)

19422. Schothorst, J. van.—Electrical pressure welding of tyre rims. 17th August, 1951. (711614.)

22171. Morphy-Richards, Ltd.—Electric irons. 22nd September, 1952. (711504.)

24406. Automatic Telephone & Electric Co., Ltd.—Telecommunication or like systems. 29th September, 1952. (711506.) 24407. Gas discharge tube circuit arrangements for generating an impulse pattern or patterns. 29th September, 1952. (711507.)

28169. English Electric Co., Ltd.—Control systems for electric motors. 7th November, 1952. (711509.)

29340. English Electric Co., Ltd.—Electronic amplifiers. 13th March, 1953. (711633.)

29990. Westinghouse Brake & Signal Co., Ltd., and Corbyn, D. B.—Circuit arrangements for the control of current supplied to a load from an alternating current source through a saturable reactor. 7th November, 1952. (711634.)

30347. Solar Manufacturing Corporation.—Capacitor testing apparatus. 28th December, 1951. (711570.)

1952

684. Gilfillan Bros., Inc.—Radar systems. 9th January, 1952. (711513.)

893. Western Electric Co., Inc.—Carrier wave telephone systems. 11th January, 1952. (711514.)

1876. Philips Electrical Industries, Ltd.—Electric-discharge tubes for short waves. 23rd January, 1952. (711643.)

3182. English Electric Co., Ltd.—Multi-stage axial-flow compressors. 6th February, 1953. (711717.)

8401. Standard Telephones & Cables, Ltd.—Electrical pulse generation circuits. 24th November, 1950. Divided out of 711561. (711574.)

8423. Metropolitan-Vickers Electrical Co., Ltd.—Magnetic crack-detecting apparatus. 30th March, 1953. Cognate application 14099, 4th June, 1952. (711521.)

8430. Siemens Bros. & Co., Ltd.—Party line telephone systems. 30th January, 1953. (711522.)

12026. Bjorkman, S. J.—Arrangements for coding electric signals. 12th May, 1952. (711577.)

14456. Westinghouse Electric International Co.—Electric switches having magnetic blow-outs. 9th June, 1952. (711726.)

14840. Philips Electrical Industries, Ltd.—Electron microscopes. 12th June, 1952. (711672.)

17023. General Electric Co.—Directional electric switches. 7th July, 1952. (711751.)

17564. Standard Telephones & Cables, Ltd.—Amplitude control unit. 11th July, 1952. (711752.)

17865. Metropolitan-Vickers Electrical Co., Ltd.—Ventilating systems for electrically propelled vehicles. 15th July, 1953. (711675.)

19296. Zenith Radio Corporation.—Frequency controllable oscillating circuit arrangements. 30th July, 1952. (711552.)

27309. British Thomson-Houston Co., Ltd.—Electric lamps or similar devices. 30th October, 1952. (711761.)

27439. Standard Telephones & Cables, Ltd.—Coders for electric pulse code communication systems. 31st October, 1952. (711762.)

31715. Philips Electrical Industries, Ltd.—Circuit arrangements for synchronizing oscillators. 15th December, 1952. (711768.)

Amended Specifications

663030. Briggs, G., & another.—Phase-shifting network.

694051. Western Electric Co., Inc.—Electrical translating devices employing semi-conductive bodies.

701872. Nield's Patents, Ltd.—Electric insulators.

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 12th June:—

DELCO-REMY. No. 713,815, Class 7. Ignition apparatus for internal combustion engines, electric generators, motors (not for land vehicles), dynamos, alternators, and parts. No. 713,816, Class 9. Electric ignition coils, circuit breakers, contact devices, relays, switches, transformers, coils, armatures, electric current and voltage regulators, resistances, and parts. No. 713,817, Class 12. Electric starting motors for land vehicles; and electric horns, windscreen wipers, mirrors (retrovisors), and parts.—General Motors Corporation, Detroit, U.S.A. Address for service, c/o Marks & Clerk, 57–58, Lincoln's Inn Fields, London, W.C.2.

RUSTON. No. 722,724. Class 7. Internal combustion turbines (not for land vehicles), compressors (machines), lighting dynamos, lighting magnetos, and parts.—Ruston & Hornsby, Ltd., Sheaf Iron Works, Waterside South, Lincoln.

AIRESEARC. No. 700,732, Class 9. Electrical and electronic apparatus and instruments and parts. No. 700,734 (design), Class 9. Electrical and electronic apparatus and instruments and parts.—Garrett Corporation, Los Angeles, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5–9, Quality Court, Chancery Lane, London, W.C.2.

CHROMATRON. No. 726,787, Class 9. Cathode-ray tubes for producing polychrome images.—Chromatic Television Laboratories, Inc., New York, U.S.A. Address for service, c/o Leslie N. Cox, 329, High Holborn, London, W.C.1.

BONOCHORD. No. 727,327, Class 9. Scientific and electrical apparatus and instruments; radio apparatus; photographic, cinematographic, optical, weighing, measuring, signalling, checking (supervision) and teaching apparatus and instruments; apparatus and instruments for recording and reproducing sound; and parts included in Class 9 of all these goods.—Bonochord, Ltd., 48, Welbeck Street, London, W.1.

MINELEC. No. 727,536, Class 9. Radio sets, television sets and parts, and electric batteries.—Minelec, Ltd., 38–39, Bruton Street, London, W.1.

CONYFLUX. No. 727,812. CONYTHERM. No. 727,813, Class 9. Electric cables and insulated electric wires.—Connollys (Blackley), Ltd., Blackley Vale Mills, Blackley, Manchester, 9.

AUTAMIX. No. 728,344, Class 9. Electric and electronic apparatus and instruments, all included in Class 9; radio, television, telephonic and signalling apparatus and instruments; sound recording, sound reproducing and sound transmitting apparatus and instruments; and parts.—J. & A. Margolin, Ltd., Plus-a-Gram House, 112–116, Old Street, London, E.C.1.

FLUOREL (design). No 716,496, Class 11. Fittings for electric lighting installations, all being goods for sale in England, Scotland and Northern Ireland.—Fluorel, Ltd., 159, Midland Road, Leyton, London, E.10.

COOKOK. No. 717,263, Class 11. Field kitchens, ovens, electric coffee roasters, heating apparatus, cooking apparatus and drying cabinets.—Société Anonyme de Représentation Générale pour l'Industrie et le Commerce, Wolueve-St.-Lambert, Belgium. Address for service, c/o Trade Mark Protection Society, 50, Lincoln's Inn Fields, London, W.C.2.

STYROFLEX. No. 718,307, Class 17. Electric insulating material in the form of tubes, tubular elements, bands, rods, cords, tape, plates and foils.—Norddeutsche Seekabelwerke A.G., Nordenham (Weser), Germany. Address for service, c/o Marks & Clerk, 57–58, Lincoln's Inn Fields, London, W.C.2.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—PERTH.—State Electricity Commission of Western Australia. Three electrically driven circulating water pumps, complete with motors, for the steam turbine condenser, etc., cooling water system proposed for Bunbury generating station. (E.S.B. 12687/54. Ten/9317.)*

Ballymena. — 1st June. Installation of underground cables at the St. Louis High School. Specifications, etc., from Mr. A. N. Irens, consulting engineer, Friends' Provident Building, 58, Howard Street, Belfast.

Belfast.—14th June. Electrical installation at St. Thomas's Boys' Voluntary Intermediate School. Specifications, etc., from Mr. A. W. Gordon Holt, consulting engineer, 74, South Parade.

24th June. City Electricity Department. Private automatic telephone system. (See this issue.)

Blackpool.—5th June. Corporation. 3-ton chassis and sectional tower body. (See this issue.)

British East Africa.—KAMPALA.—10th June. Municipal Council. Street lighting equipment. (E.S.B. 12679/54. Ten/9297.)*

Dundee.—9th June. Corporation. Street lighting equipment. (See this issue.)

Durham.—3rd June. Education Committee. Electrical installation in technical college and three schools. (See this issue.)

Formosa.—TAIPEI.—14th June. Central Trust of China. Lead, antimony and battery separators. (E.S.B. 12692/54. Ten/9298).*

22nd June. Taiwan Power Co. Bare stranded hard drawn copper conductor. (E.S.B. 12381/54. Ten/9312.)*

India.—MADRAS.—7th June. Government of Andhra Electricity Department. A.c.s.r. conductors and accessories. (E.S.B. 1239/54. Ten/9270.)*

CALCUTTA.—21st June. Damodar Valley Corporation. Conductors, ground wire and tower earthing sets. (E.S.B. 12787/54. Ten/9310).*

Iraq.—BAGDAD.—28th June. Directorate General of Municipalities. 50 kW diesel d.c. generating set at Refai, Muntafik Liwa. (E.S.B. 12990/54. Ten/9334.)*

Islington.—21st June. Borough Council. Vehicle-actuated traffic signals at the Essex Road/Canonbury Road/New North Road junction. Forms from the borough engineer, Town Hall, Upper Street, N.1.

Manchester.—16th June. Housing Committee. Electrical installations in 397 houses on the Langley estate. (See this issue.)

New Zealand.—WELLINGTON.—14th July. Post and Telegraph Department. 400 electric torches. (E.S.B. 12663/54. Ten/9291.)*

North of Scotland. — Hydro-Electric Board. 11 h.v. and l.v. overhead lines in the Glen Esk and Glen Clova areas. (See this issue.)

Pakistan. — KARACHI. — 2nd August. Department of Supply and Development. 1,500 kW turbo-alternator set complete with steam raising plant, etc., for the Saidpur power station. (E.S.B. 12692/54. Ten/9323.)*

LAHORE. — 12th June. Stores Purchase Officer, Punjab. L.v. 660 V ironclad switchboard. (E.S.B. 12368/54. Ten/9265.)*

Philippine Republic. — MANILA. — 3rd August. National Power Corporation. Plant for Lake Buhi-Barit hydro-electric river project No. 1, Buhi, Camarines Sur, including one 2,600 h.p. hydraulic turbine, one 2,000 kVA generator, one 2,000 kVA transformer, switchgear, etc. (E.S.B. 12953/54. Ten/9326.)*

St. Helens.—Education Committee. Firms wishing to tender for plumbing work, central heating and electrical installation at St. Helens Technical College, should submit their names by 8th June. (See this issue.)

South Africa. — JOHANNESBURG. — 16th June. Stores Department, South African Railways. V.i.r. wire. (E.S.B. 12967/54. Ten/9324.)* 23rd June. Electric cable. (E.S.B. 12957/54. Ten/9325.)* 24th June. Electric cable for motor vehicles. (E.S.B. 12803/54. Ten/9303.)* Electric cable. (E.S.B. 12956/54. Ten/9330)*

Turkey.—ANKARA.—14th June. Posts, Telephones and Telegraphs. Rubber insulated copper wire. (E.S.B. 12565/54. Ten/9284.)*

Tyrone.—County Education Committee. Electrical installation at the Hutton Primary School, Beragh. Forms from the Chief Education Officer, Education Offices, Omagh.

United States. — DENVER. — 8th June. Bureau of Reclamation. Air switches for Watertown substation, Missouri River Basin Project. (E.S.B. 12526/54. Ten/9272.)*

SEATTLE.—15th June. Seattle District Army Corps of Engineers. Lightning arrestors, bus and suspension insulators, and disconnecting switch for the Chief Joseph Dam. (E.S.B. 12738/54. Ten/9328.)*

Uruguay. — MONTEVIDEO. — 16th June. Banco de la Republica Oriental del Uruguay. Electrocardiograph apparatus. (E.S.B. 12447/54. Ten/9276.)*

21st June. Ministerio de Salud Publica. X-ray apparatus. (E.S.B. 12423/54. Ten/9278.)*

29th June. Government. A.c. generator for medical services centre. (E.S.B. 13124/54. Ten/9365.)*

Woodbridge.—14th June. U.D.C. Multi-stage submersible electric motor pump, complete with fully automatic starter and fittings. Forms from the water engineer, Bredfield Road Waterworks.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bexhill-on-Sea.—Houses (68), Southlands Road; borough surveyor.

Classroom block, Ancaster House School; J. E. Maynard, architect, 1, Collington Avenue.

Calne.—Classroom block for St. Mary's School; W. Curtis Green, Son & Lloyd, architects, 5, Pickering Place, London, S.W.1.

Clowne.—Seven blocks of flats, Station Road, Whitwell, for R.D.C.; Ernest Ilett & Son, Ltd., West Street, Worksop.

Coventry.—Herbert Art Gallery and Museum; Herbert & Son, architects, 18 Friar Lane, Leicester.

Dewsbury.—Branch library, Heckmondwike Road; borough engineer.

Gateshead.—Factory additions for the Liner Concrete Machinery Co., Ltd.; Thomas Clements & Son, builders, Jesmond, Newcastle-on-Tyne.

Hainault.—Factory, L.C.C. estate; Chamberlain Industries, Ltd., Staffa Works, Staff Road, London, E.10.

Hendon.—Factory, North Circular Road National Cash Register Co., Ltd., 206, Marylebone Road, Paddington, London, N.W.1.

Leicester.—Adaptation of Scraptoft Hall a training college; city architect.

London.—CITY.—Office block, 79/83, Chiswell Street; Messrs. Joseph, architects, 10 Lowndes Square, S.W.1.

STEPNEY.—Factory, Mile End Road; R. Seifert, architect, 28, Great Ormond Street, W.C.1.

SOUTHWARK.—Printing works, offices, etc., in Colombo Street; Franey & Co., Ltd. publishers, Graham House, Tudor Street, E.C.4.

Luton.—Shops with dwellings over, with three-storey blocks of flats, Cross Way, Farley Hill; director of housing, Town Hall.

Manchester.—Extensions to biscuit factory, Northenden, for W. J. Brookes & Sons, Ltd.; Taylor Whalley & Spyra, 103, Portland Street, Manchester.

Two-storey extension to works, Clayton, for John Mountford, Ltd.; Moore Diplock & Associates, architects, 26, Rodney Street, Liverpool.

Newcastle-on-Tyne.—Extensions to factory at Cowgate for Barluze, Ltd.; Constables, Ltd., Great House, Great Market.

Bus station at the old cattle market (£250,000); city engineer, Town Hall.

Factory, Station Road, Walker (£10,000); R. N. Dodds & Sons, Hadrian Ironworks, Wallsend.

Extensions to factory; Passmill, Ltd., 43–49, Lime Street.

Northumberland.—Maternity and child welfare centre at Haltwhistle; county architect, County Hall, Newcastle-on-Tyne.

Ormskirk.—Houses (40), at Mill Dam Lane, Burscough, for U.D.C.; surveyor, Council Offices, Burscough Street.

Oxford.—Masonic hall, Banbury Road; Freeborn & Aitken, architects, 30, Fitzroy Square, London, W.1.

Peterborough.—Factory extensions; F. Perkins, Ltd., Oxney Road.

Portsmouth.—Dairy and offices, Western Road, Wymering; Portsmouth Dairies, Ltd., 83, Duncan Road.

Ripley.—Bus station, Elms estate (£16,676); U.D.C. surveyor.

Ripon.—Houses (49), Leed Lane; city surveyor.

Rochdale.—Houses (78), Kirkholt estate; borough surveyor, Town Hall.

Rowley Regis.—Houses (98), Corngreaves estate; architect, Building Department, Municipal Buildings, Old Hill, Staffs.

Scunthorpe.—Westcliff Gardens Secondary Modern School, for Lindsey County Council (£200,248); county architect, Lincoln.

Sunderland.—Factory, Pallion, for Edison Swan Electric Co.; S. W. Milburn & Partners, architects, 9, Esplanade.

Uxbridge. — Extensions to Bishopshalt Grammar School (£55,000); Middlesex county architect, 1, Queen Anne's Gate, London, S.W.1.

Twickenham.—With regard to the note in our issue of 7th May, we are informed that although it has been suggested that the Corporation should provide a theatre at Cross Deep, no decision to that effect has been made and the Corporation is unlikely to proceed with the matter at the present time.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).